9-2350-257-34-2-5

TM 9-2350-257-34-2-5

CHAPTER 14 THRU 19	
MAINTENANCE INSTRUCTIONS	14-1

FOLDOUTS
EQUIPMENT LOCATION DIAGRAMS

TECHNICAL MANUAL

DIRECT SUPPORT
AND GENERAL SUPPORT
MAINTENANCE MANUAL

This copy is a reprint which includes current pages from Change 1.

PART 5

MAINTENANCE

TURRET FOR TANK, COMBAT, FULL-TRACKED: 105-MM GUN, M60A1 (RISE) (2350-00-116-9765) AND M60A1 (RISE PASSIVE) (2350-01-059-1503)

HEADQUARTERS, DEPARTMENT OF THE ARMY
JULY 1980

D 101.11:

READEX FICHE best copy available

WARNING

BE CAREFUL: CARBON MONOXIDE IS A GAS THAT CAN KILL YOU

Carbon monoxide always comes when something gets hot or burns - such as heaters, engines, etc. To keep carbon monoxide from making anyone sick or drowsy, there must be plenty of fresh air in the place where the heating or burning takes place. This gas has no color and no smell, but it is deadly poisonous. It can damage your brain, or kill you, if you do not have enough fresh air coming in to push the carbon monoxide out.

Follow these rules to keep from getting poisoned:

1. Do not operate engine or heater inside a building unless there is plenty of fresh air coming in.
2. Do not idle an engine unless you are sure there is plenty of fresh air in personnel compartments.
3. Do not drive a vehicle which has inspection plates, cover plates or engine compartment doors taken off, except for very short maintenance times when necessary.
4. When operating vehicle, always be on the lookout for personnel who seem to be getting sick or drowsy. If you notice this happening, immediately get fresh air into personnel compartments. If this does not help, remove sick or drowsy personnel from vehicle and do following:
    a. Put him into fresh air.
    b. Keep him covered warm.
    c. Keep him still. Do not let him exercise. (Exercise will make him worse.)
    d. Give him artificial respiration, if necessary.
    e. Get medical help.

CHANGE

No. 1

TM 9-2350-257-34-2-5
C1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 18 February 1987

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

PART 5
MAINTENANCE MANUAL

TURRET FOR TANK, COMBAT, FULL-TRACKED: 105-MM GUN, M60A1 (RISE)
(2350-00-116-9765)
AND
M60A1 (RISE PASSIVE)
(2350-01-059-1503)

TM 9-2350-257-34-2-5, 11 July 1980, is changed as follows:

1. Remove old pages and insert new pages as indicated below.
2. New or changed material is indicated by a vertical bar in the margin of the page.
3. New or changed illustrations are indicated by a miniature pointing hand highlighting the change.
4. The nomenclature for grenade launcher is changed to grenade discharger throughout this manual.

Remove Pages	Insert Pages
i and ii	i and ii
Index 1 and Index 2	Index 1 and Index 2
FO-5	FO-5

File this sheet in the back of the publication for reference purposes.

By Order of the Secretary of the Army:

JOHN A. WICKHAM, JR.
General, United States Army
Chief of Staff

Official:

R. L. DILWORTH
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:

To be distributed in accordance with DA Form 12-37, Direct Support and General Support Maintenance requirements for Tank, Combat, Full Tracked, 105-MM, M60A1 RISE and M60A1 RISE PASSIVE.

WARNING

WARNING
RADIATION HAZARD

Azimuth dial pointers in indicator are tipped with radioactive material. This becomes dangerous when dial window is broken or removed. When this happens, make repairs as soon as possible.

All maintenance must be done at depot level only, except replacement of lamps or replacement of whole indicator unit.

Protecting, handling, storing, and getting rid of radioactive material must be done in accordance with TB MED-232 and TB 750-237.

WARNING

Be careful when working around pressurized parts. Hydraulic fluid under pressure can hurt you.

WARNING

Before charging main accumulator, hydraulic system pressure must be lowered to 0 psi. Hydraulic fluid under pressure can hurt you.

WARNING

Before draining hydraulic system, pressure must be lowered to 0 psi. Hydraulic fluid under pressure can hurt you.

WARNING

Before removing hydraulic tubes, hydraulic system pressure must be lowered to 0 psi. Hydraulic fluid under pressure can hurt you.

WARNING

Before traversing turret, make sure gun will not hit anything if turret is traversed. If necessary, move vehicle.

WARNING

Nitrogen under pressure can hurt you. Keep fingers and hands clear of valve while letting out nitrogen. Let nitrogen out slowly.

LIST OF EFFECTIVE PAGES

INSERT LATEST CHANGED PAGES. DESTROY SUPERSEDED PAGES.

NOTE: The portions of the text affected by the changes are indicated in the outer margins of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by shaded areas.

Dates of issue for original and changed pages are:

Original ..... 0 .....11 July 1980

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 315 CONSISTING OF THE FOLLOWING:

Page No.	*Change No.
Cover	0
a - c	0
A	0
B Blank	0
i - ii	0
14-1 - 14-9	0
14-10 Blank	0
14-11 - 14-15	0
14-16 Blank	0
14-17 - 14-33	0
14-34 Blank	0
14-35 - 14-66	0
15-1 - 15-3	0
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15-5 - 15-15	0
15-16 Blank	0
15-17 - 15-37	0
15-38 Blank	0
15-39 - 15-53	0
15-54 Blank	0
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18-1 - 18-13	0
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18-41 - 18-43	0
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19-3 - 19-11	0
19-12 Blank	0
19-13 - 19-23	0
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Index 4 Blank	0
FO-1 - FO-5	0
Metric Conversion Chart	0
Cover	0

*Zero in this column indicates an original page.

Technical Manual
No. 9-2350-257-34-2-5

HEADQUARTERS,
DEPARTMENT OF THE ARMY
Washington, D.C., 11 July 1980

Technical Manual Direct Support and General Support Maintenance

TURRET

FOR TANK, COMBAT,

FULL-TRACKED:

105-MM GUN,

M60A1 (RISE)
(2350-00-116-9765)
AND
M60A1 (RISE PASSIVE)
(2350-01-059-1503)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know.

Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual directly to:

Commander
US Army Armament, Munitions and Chemical Command
ATTN: AMSMC-MAS
Rock Island, IL 61299-6000

A reply will be furnished to you.

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* This manual in conjunction with TM 9-2350-257-34-2-1, TM 9-2350-257-34-2-2, TM 9-2350-257-34-2-3, TM 9-2350-257-34-2-4, and TM 9-2350-257-34-2-6 supersedes TM 9-2350-257-34-2, December 1975, and so much of the DS/GS portion of TM 9-1000-213-35, April 1976, as pertains to the M60A1 (RISE) and M60A1 (RISE PASSIVE) Tanks, including all changes.

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CHAPTER 14

COMMANDER'S CONTROL HANDLE

14-1. MAINTENANCE PROCEDURES INDEX

				Tasks			
Equipment Item	Test	Adjust-ment	Removal	Instal-lation	Disas-sembly	Assembly	Repair
1. Commander's Control Handle	14-2	14-3	. . .	. . .	14-4	14-5	. . .
2. Elevation Arm	. . .	. . .	14-6	14-7	. . .	. . .	. . .
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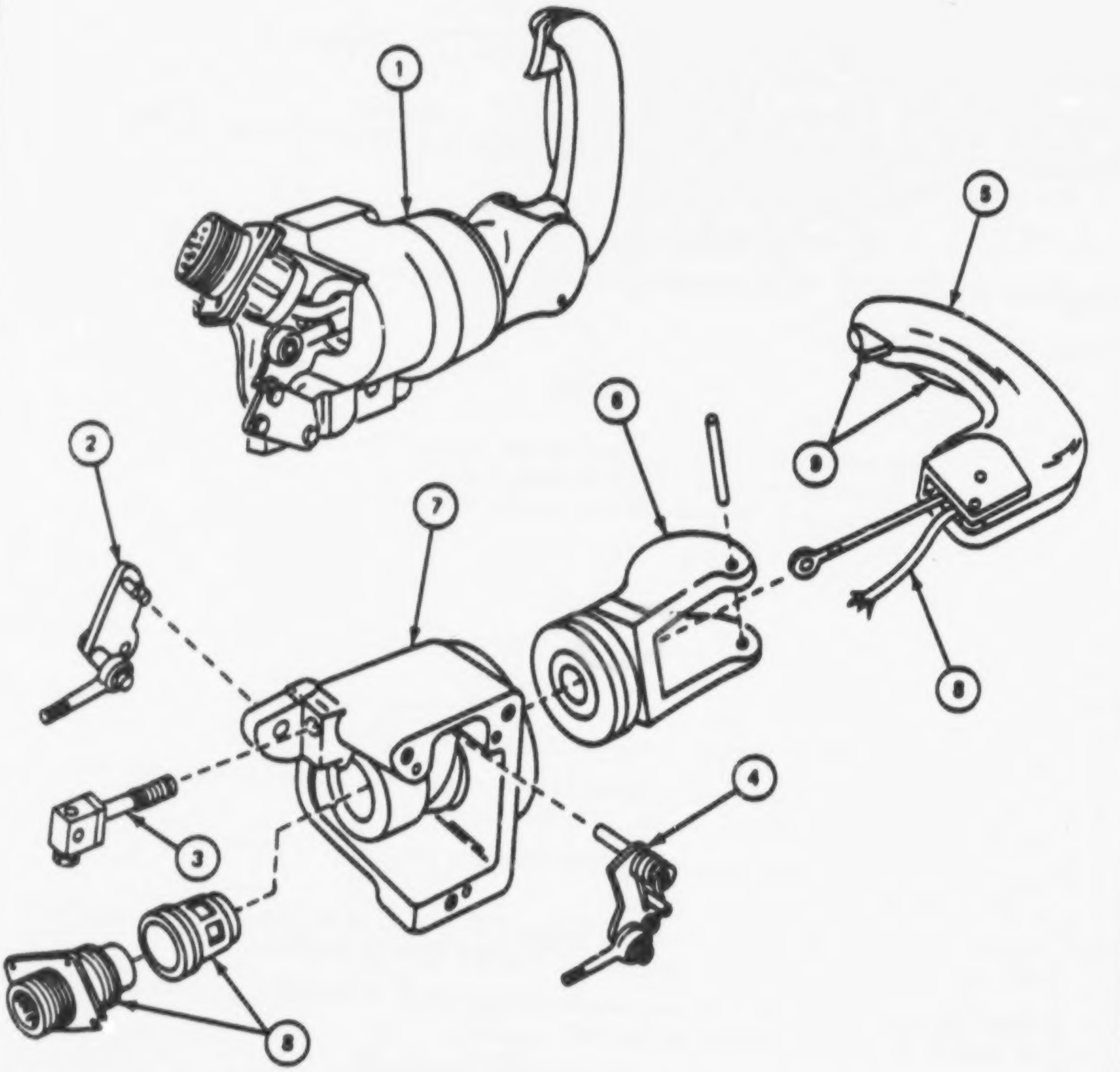
4. Traverse Arm	. . .	. . .	14-8	14-9	14-10	14-11	. . .
5. Grip	. . .	. . .	14-12	14-13	14-14	14-15	. . .
6. Bracket	. . .	. . .	14-16	14-17	. . .	. . .	. . .
7. Housing	. . .	. . .	14-16	14-17	14-18	14-19	14-20
8. Harness	. . .	. . .	14-12	14-13	. . .	. . .	. . .
9. Switch	. . .	. . .	14-14	14-15	. . .	. . .	. . .



14-2. COMMANDER'S CONTROL HANDLE TEST PROCEDURE

TEST EQUIPMENT: Elevating protractor (fabricated tool, item 1, App. B)
Traversing protractor (fabricated tool, item 1, App. B)
Multimeter
Spring scale
6" machinist steel rule

TOOLS: 3/8" flat tip screwdriver
7/16" combination wrench

PERSONNEL: One

REFERENCES: TM 9-2350-257-20-2-3 for procedure to remove commander's control handle
JPG for procedures to:
Use multimeter
Check continuity

EQUIPMENT CONDITION: Commander's control handle removed (TM-20-2-3)

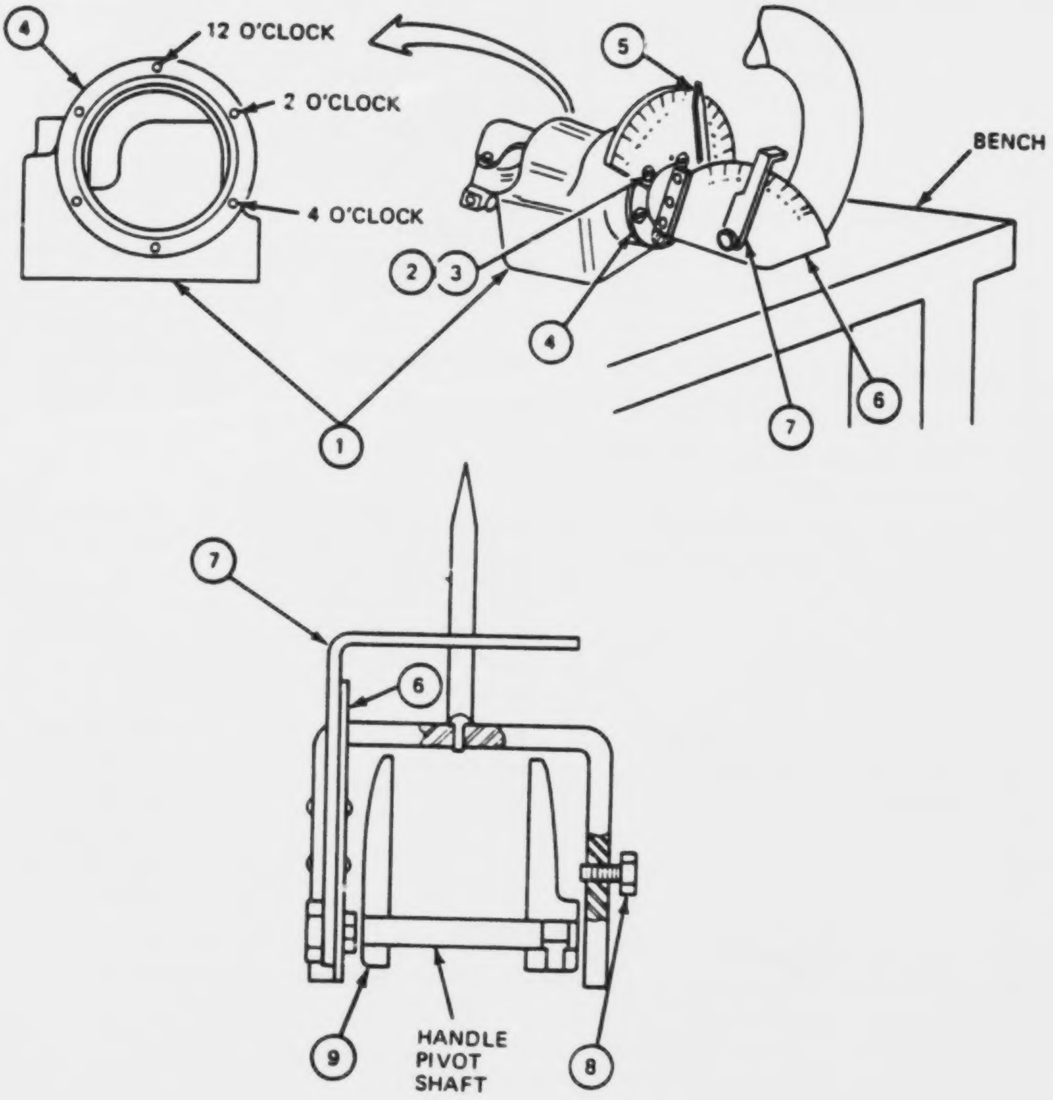
GENERAL INSTRUCTIONS:

NOTE

If normal indication is not obtained, commander's control handle is bad or out of adjustment. Refer to section index (para 14-1) for adjustments or for replacement of bad parts.

FRAME 1

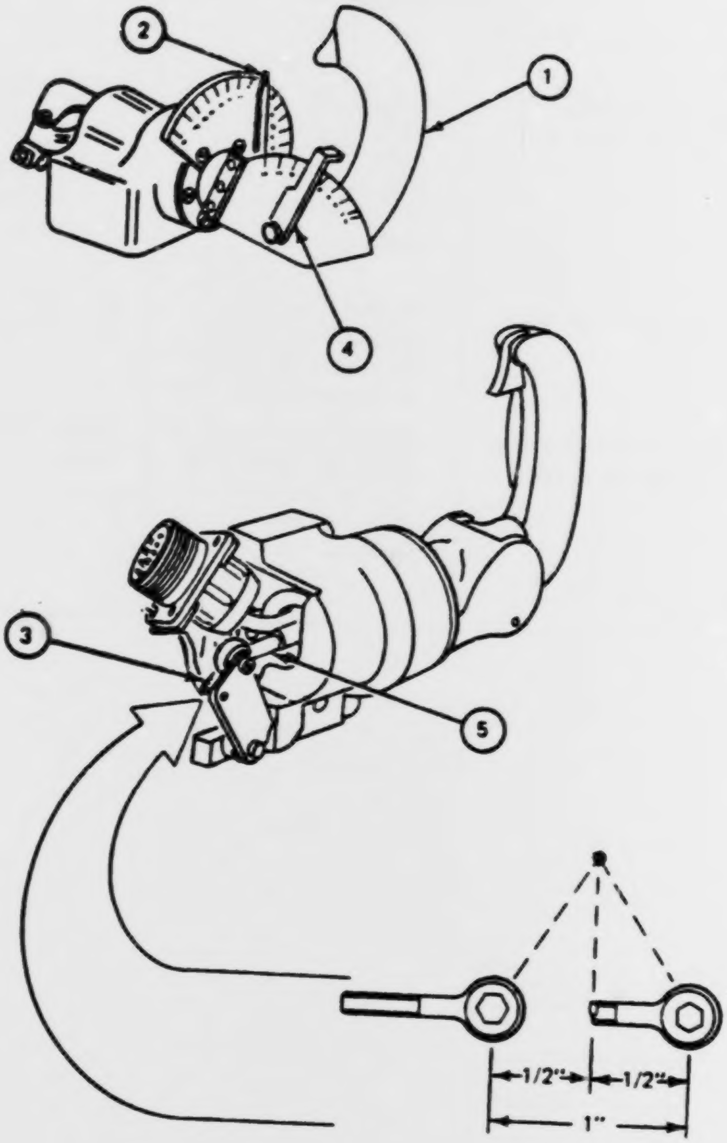
Step	Procedure
1.	Place control handle on bench resting on housing cover (1).
2.	Using screwdriver, remove three screws (2) and three lockwashers (3) attaching cam plate (4) to housing (1) at the 12, 2, and 4 o'clock positions.
3.	Line up hole below zero degree mark on traversing protractor (5) with hole at 2 o'clock position on cam plate (2).
4.	Using screwdriver, attach traversing protractor (5) to cam plate (4) with three screws (2) and three lockwashers (3) in holes at 12, 2 and 4 o'clock positions.
5.	Place elevating protractor (6) over handle so that pivot of elevating protractor pointer (7) is directly over end of handle pivot shaft.
6.	Using wrench, tighten screw (8) against handle bracket (9). GO TO FRAME 2


12 O'CLOCK
2 O'CLOCK
4 O'CLOCK
BENCH
HANDLE
PIVOT
SHAFT

14-2. COMMANDER'S CONTROL HANDLE TEST PROCEDURE (CONT)

FRAME 2

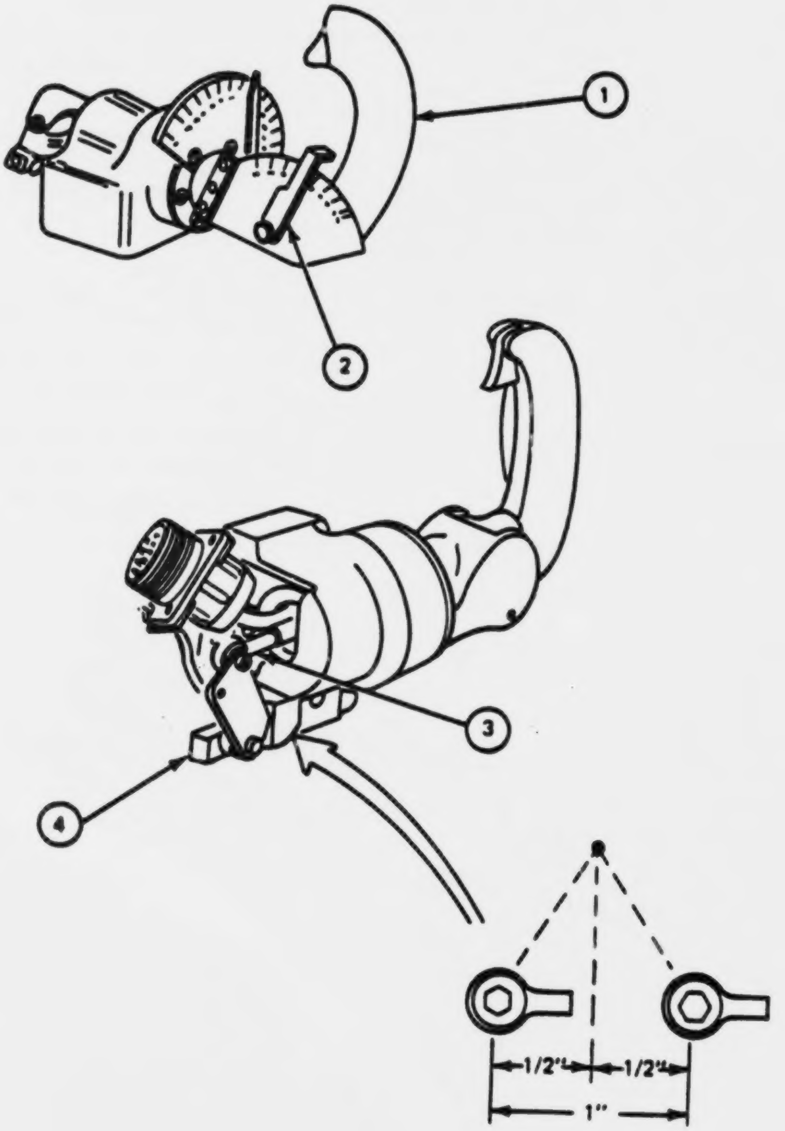
Step	Procedure	Normal Indication	Probable Fault
1.	Move handle (1) left.	Traversing pointer (2) moves to between 85 and 95 degrees. Traversing arm rod end (3) moves at least .1/2 inch.	a. Surfaces of traversing arm worn b. Handle bracket out of adjustment.
2.	Let handle (1) go to neutral.	Handle automatically returns to neutral (0 degree mark).	a. Bad traversing arm centering spring. b. Bad cam bearing
3.	Move handle (1) right.	Same as step 1.	Same as step 1.
4.	Let handle (1) go to neutral.	Same as step 2.	Same as step 2.
5.	Push handle (1) forward until it touches stop.	. . .	. . .
6.	Set rear edge of elevating pointer (4) against front part of handle (1).	Pointer (4) should be between 25 and 30 degrees. Elevation arm rod end (5) should move at least 1/2 inch.	a. Elevating arm rod end out of adjustment. b. Camlock block out of adjustment.
7.	Let handle (1) go to neutral and push pointer against handle.	Handle automatically returns to neutral (0 degree mark).	a. Bad plunger spring. b. Plunger binding c. Cam lock block out of adjustment
	GO TO FRAME 3		


1/2"
1/2"
1"

14-2. COMMANDER'S CONTROL HANDLE TEST PROCEDURE (CONT)

FRAME 3

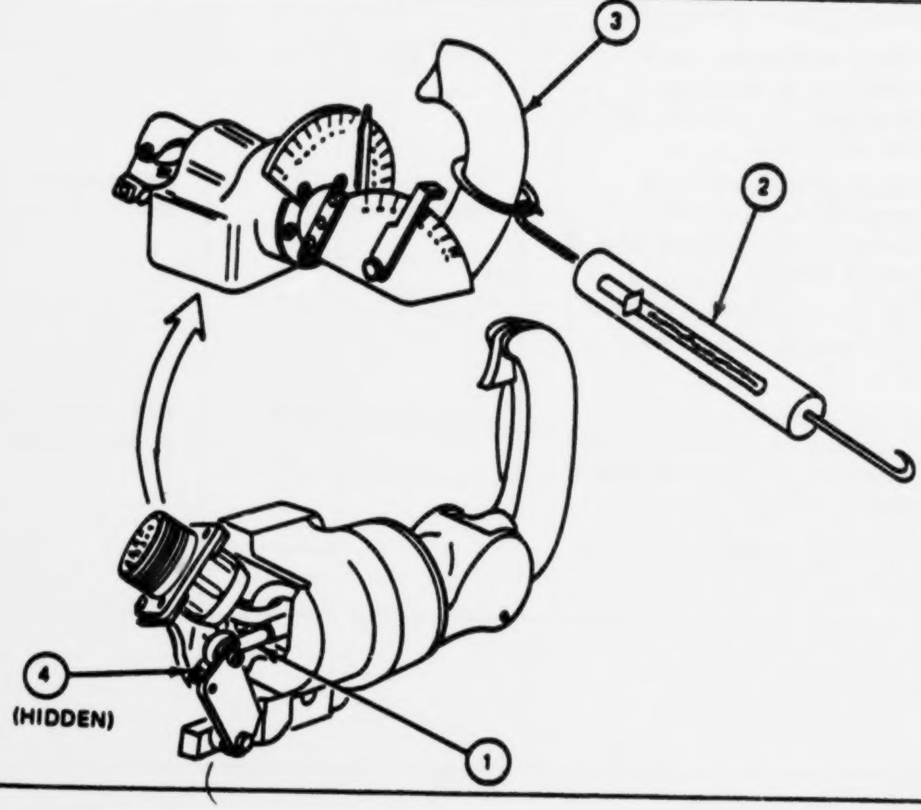
Step	Procedure	Normal Indication	Probable Fault
1.	Pull handle (1) to rear until it touches stop.	. . .	. . .
2.	Set rear edge of elevation pointer (2) against front part of handle (1).	Pointer (2) between 25 and 30 degrees. Elevation arm rod end (3) moves at least 1/2 inch.	a. Elevation rod end (3) out of adjustment. b. Cam lock block (4) out of adjustment.
3.	Let handle (1) go to neutral.	Handle automatically returns to neutral (0 degree mark).	a. Bad plunger spring. b. Plunger binding .
4.	Move handle (1) from stop to stop for both elevation and traverse.	Movement smooth and even from stop to stop for both elevation and traverse.	Dirty, worn, or bad parts.
	GO TO FRAME 4		


1
2
3
4
1/2"
1/2"
1"

14-2. COMMANDER'S CONTROL HANDLE TEST PROCEDURE (CONT)

FRAME 4

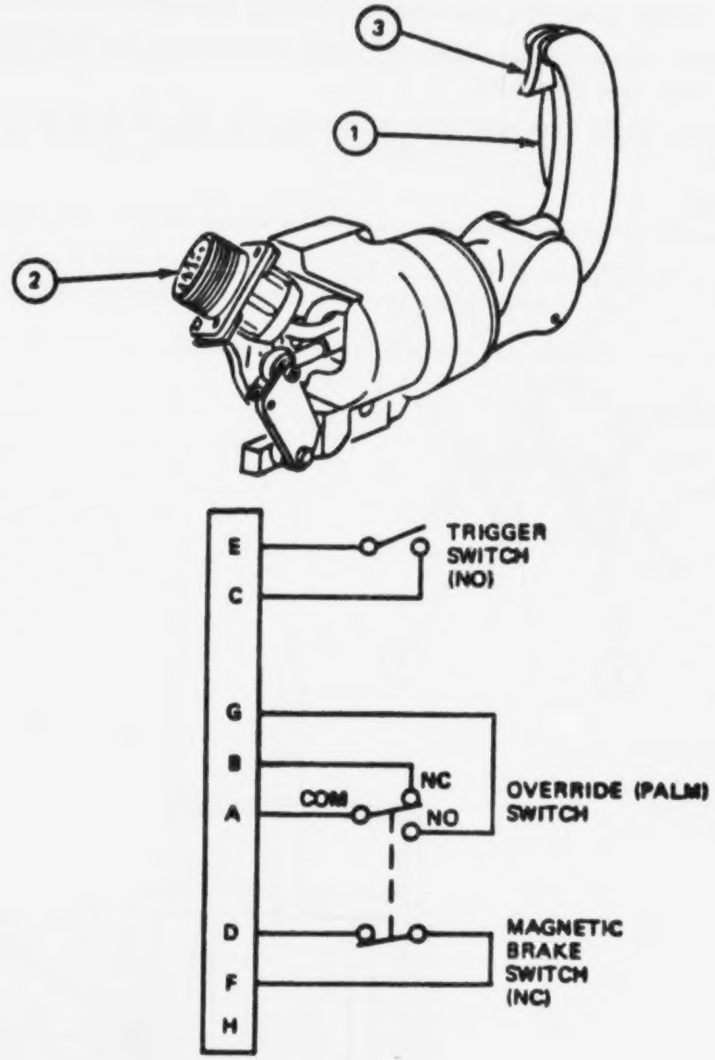
Step	Procedure	Normal Indication	Probable Fault
1.	Hold elevation arm rod end (1) so it cannot move.	. . .	. . .
2.	Attach spring-scale (2) to handle (3). Using spring-scale, pull handle backward.	Handle (3) moves not more than 2 degrees with a pull of 35 to 45 ounce-inches.	Too much backlash because of worn parts.
3.	Repeat steps 1 and 2 for handle (3) forward direction.	Same as step 2.	Same as step 2.
4.	Hold traverse arm rod end (4) so it cannot move.	. . .	. . .
5.	Repeat step 2 for handle (3) left and right directions. GO TO FRAME 5	Same as step 2.	Same as step 2.



14-2. COMMANDER'S CONTROL HANDLE TEST PROCEDURE (CONT)

FRAME 5

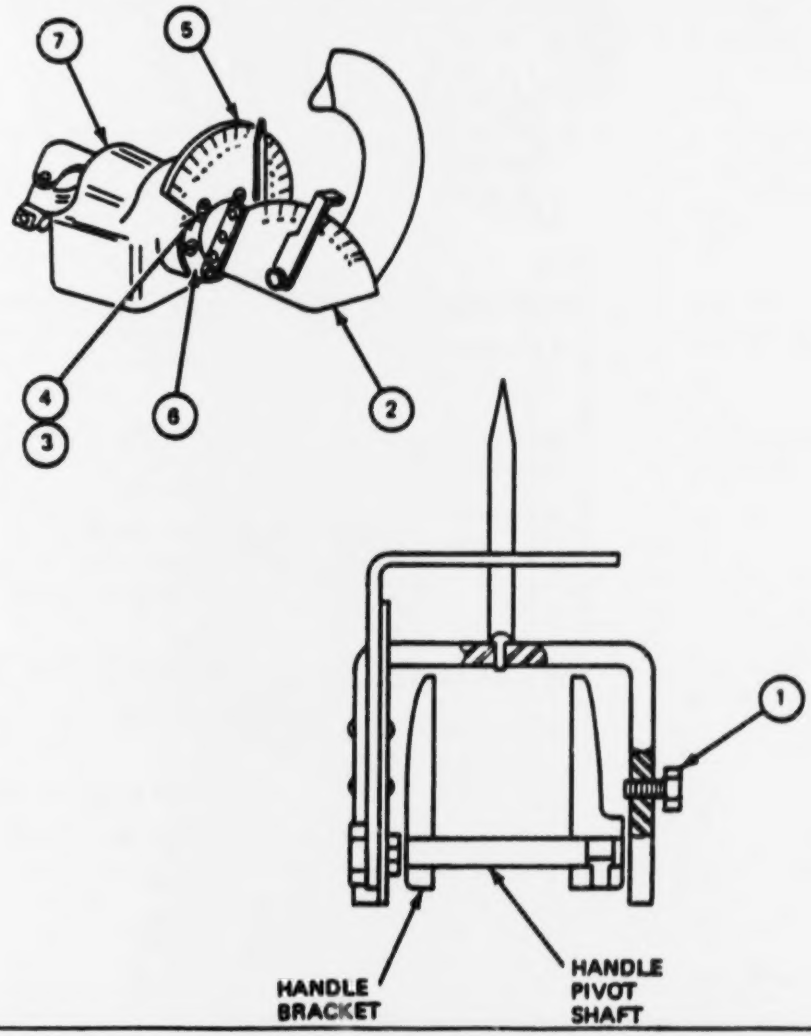
Step	Procedure	Normal Indication	Probable Fault
1.	Make sure palm switch (1) is not pressed in.	. . .	. . .
2.	Using multimeter, check continuity at electrical connector (2) between (JPG):		
	a. pins A and B	a. Less than 2 ohms	a. Bad override switch or bad wiring.
	b. pins D and F	b. Less than 2 ohms	b. Bad magnetic brake.switch or bad wiring.
	c. pins A and G	c. Greater than 10 million ohms	c. Bad override switch or switch out of adjustment.
3.	Press in palm switch (1).	. . .	. . .
4.	Using multimeter, check continuity at electrical connector (2) between pns A and G (JPG).	Less than 2 ohms	Bad override switch or bad wiring.
5.	Using multimeter, check continuity at electrical connector (2) between pins D and F (JPG).	Greater than 10 million ohms	Bad magnetic brake switch or bad wiring.
6.	Let go of palm switch (1) and press in trigger switch (3).	. . .	. . .
7.	Using multimeter, check continuity at electrical connector (2) between pins C and E (JPG).	Less than 2 ohms	Bad trigger switch or bad wiring.
8.	Let go of trigger switch (3). GO TO FRAME 6	. . .	. . .


3
1
2
E
C
G
B
A
D
F
H
TRIGGER
SWITCH
(NO)
NC
COM
NO
OVERRIDE (PALM)
SWITCH
MAGNETIC
BRAKE
SWITCH
(NC)

14-2. COMMANDER'S CONTROL HANDLE TEST PROCEDURE (CONT)

FRAME 6

Step	Procedure
1.	Using wrench, loosen screw (1) and remove elevating protractor (2).
2.	Using screwdriver, remove three screws (3), three lockwashers (4), and traversing protractor (5) from cam plate (6).
3.	Using screwdriver, attach cam plate (6) to housing (7) with three screws (3) and three lockwashers (4).
	END OF TASK


7
5
4
3
6
2
1
HANDLE BRACKET
HANDLE PIVOT SHAFT

14-3. COMMANDER'S CONTROL HANDLE ADJUSTMENT PROCEDURE

TEST EQUIPMENT: Elevating protractor (fabricated tool, item 1, App. B)
Traversing protractor (fabricated tool, item 1, App B)

TOOLS: Smooth file
3/32" socket head screw key (Allen wrench)
1/2" open end wrench
3/8" combination wrench
3/8" drive ratchet
5/16" socket (3/8" drive)

SUPPLIES: Thread sealing compound (item 27, App. A)

PERSONNEL: One

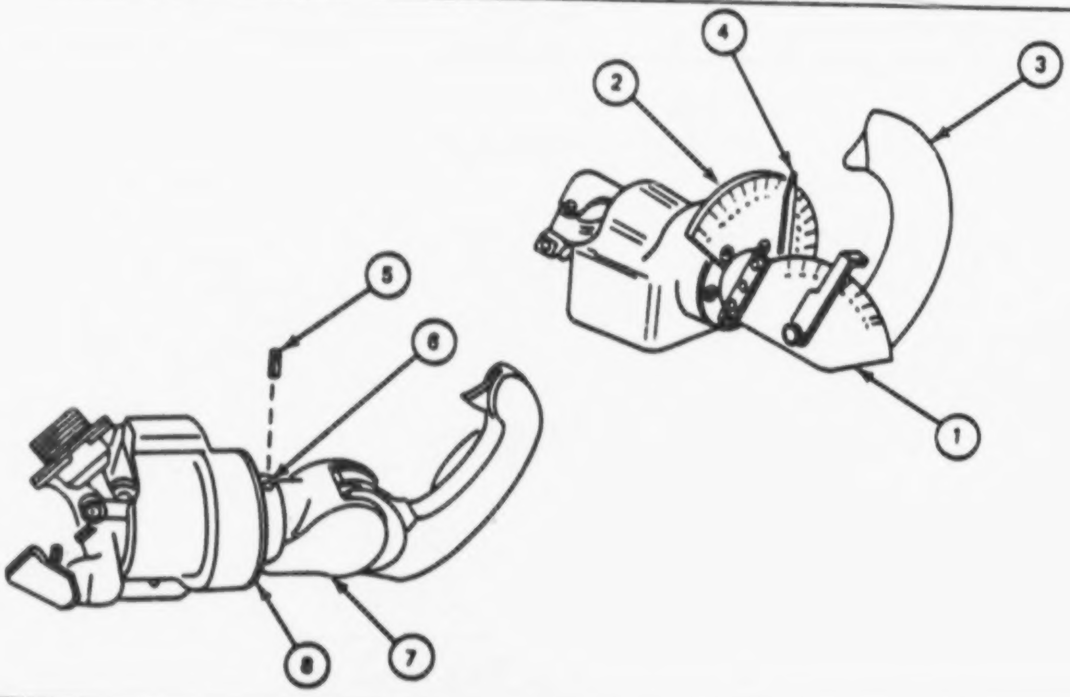
REFERENCES: TM 9-2350-257-20-2-3 for procedure to remove commander's control handle
JPG for procedure to use thread sealing compound

EQUIPMENT CONDITION: Commander's control handle removed (TM-20-2-3)

14-3. COMMANDER'S CONTROL HANDLE ADJUSTMENT PROCEDURE (CONT)

FRAME 1

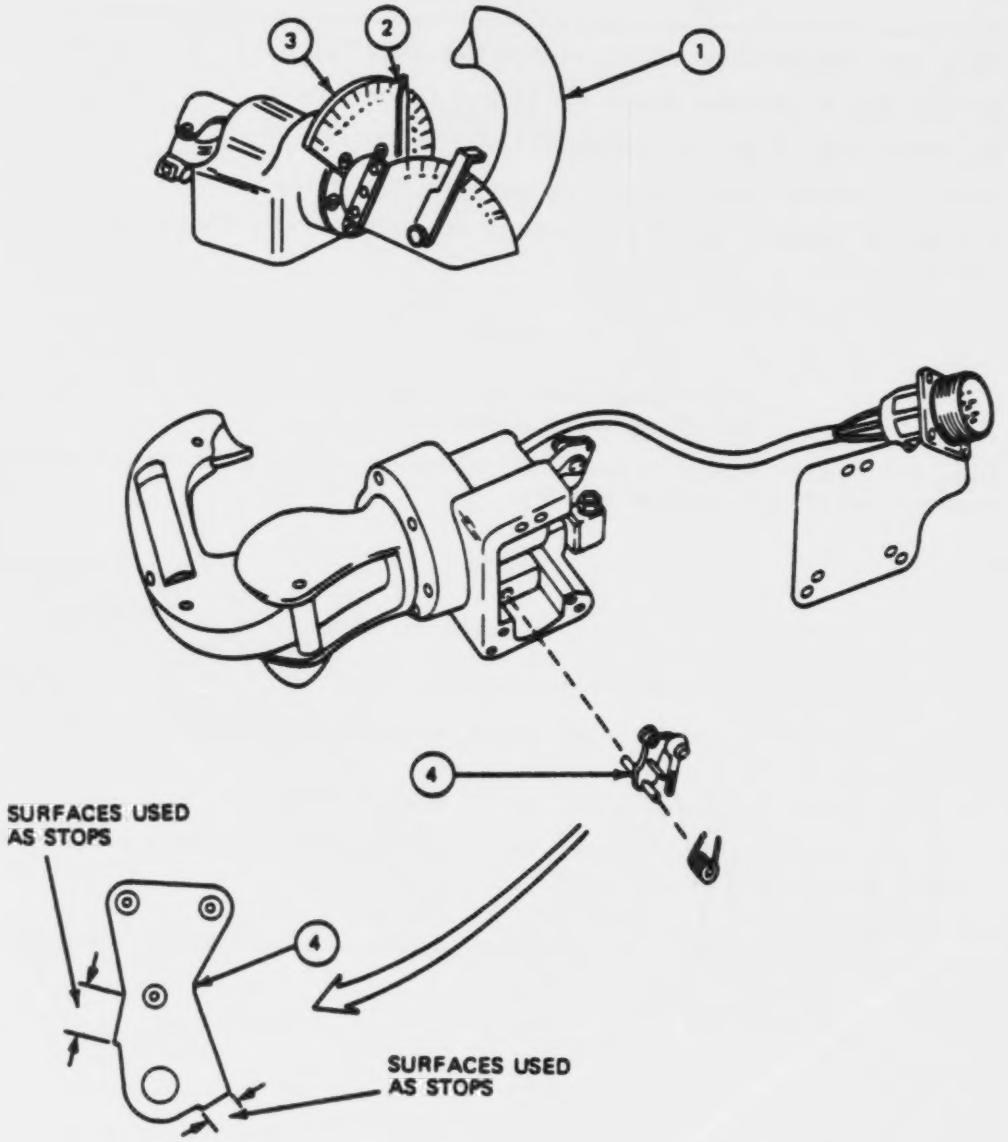
Step	Procedure
1.	Install elevating protractor (1) and traversing protractor (2) (para 14-2, frame 2).
2.	With handle (3) at neutral, traversing pointer (4) should be lined up with 0 degree mark on traversing protractor (2).
	NOTE If traversing pointer (4) is lined up with 0 degree mark, go to frame 2.
3.	Using Allen wrench, remove three setscrews (5).
4.	Using Allen wrench, loosen three setscrews (6) holding handle bracket (7) to cam (8).
5.	Holding cam (8), turn handle bracket (7) until traversing pointer (4) is lined up with 0-degree mark on traversing protractor (2).
6.	Using Allen wrench, tighten three setscrews (6) holding handle bracket (7) to cam (8).
7.	Using Allen wrench, put in three setscrews (5).
	GO TO FRAME 2



14-3. COMMANDER'S CONTROL HANDLE ADJUSTMENT PROCEDURE (CONT)

FRAME 2

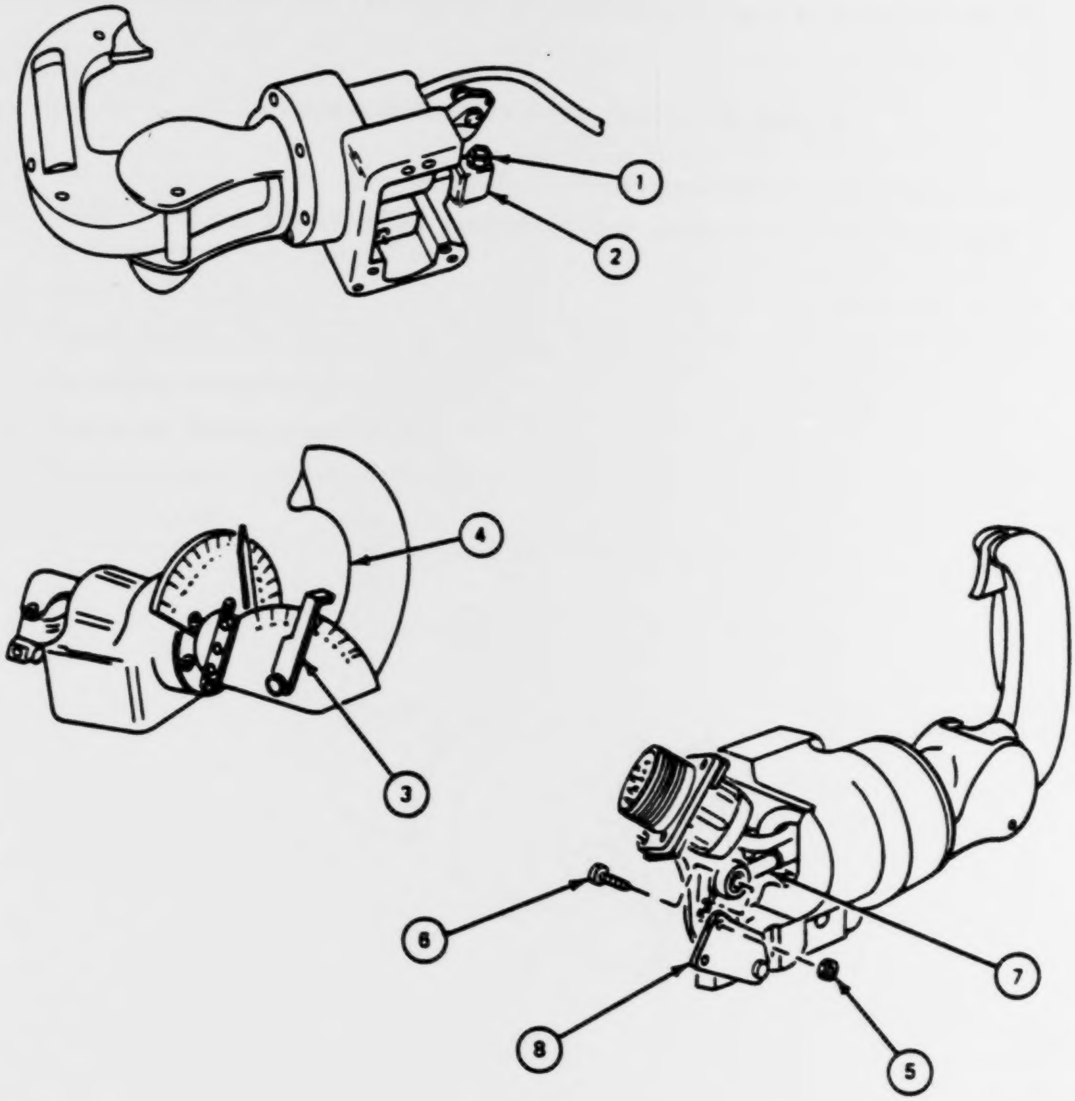
Step	Procedure
1.	Move handle (1) left until it stops. Traversing pointer (2) should move to between 85 and 95 degrees marks on traversing protractor (3).
2.	Repeat step 1 for right movement of handle (1). **NOTE** If traversing travel is good, go to frame 3.
3.	Remove traverse arm (4) (para 14-8). **NOTE** If traversing travel is less than 85 degrees left or right, surfaces of traverse arm (4) used as stops may be filed down, as necessary. If traversing travel is more than 95 degrees, replace traverse arm.
4.	Install traverse arm (para 14-9).
5.	Repeat steps 1 and 2 above to check adjustment of traversing travel. GO TO FRAME 3


SURFACES USED AS STOPS
SURFACES USED AS STOPS

14-3. COMMANDER'S CONTROL HANDLE ADJUSTMENT PROCEDURE (CONT)

FRAME 3

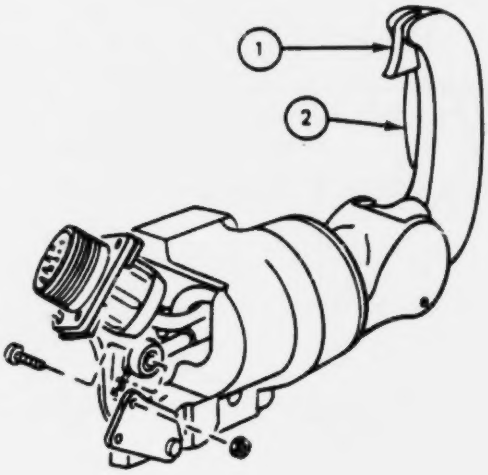
Step	Procedure
1.	Using 1/2" wrench, loosen nut (1) on cam lock block (2).
2.	Set rear edge of protractor pointer (3) on zero degree mark.
3.	Set forward edge of grip (4) against protractor pointer (3).
4.	Using 1/2" wrench, tighten nut (1) on cam lock block (2).
5.	Pull grip (4) rearward and check movement on protractor (should travel 25 to 30 degrees).
	NOTE If movement is more than 25 degrees and less than 30 degrees, go to frame 4.
6.	Using 3/8" wrench on nut (5) and 5/16" wrench on screw (6), remove nut and screw from rod end (7) and elevation arm (8).
	NOTE Rod end (7) should be turned counterclockwise for movement less than 25 degrees and clockwise for movement greater than 30 degrees.
7.	Using hands, turn rod end (7) to get proper movement. Repeat steps 1 through 6 as required.
8.	Put thread sealing compound on rod end (7) threads (JPG).
9.	Using 3/8" wrench on nut (5) and 5/16" wrench on screw (6), attach rod end (7) to elevation arm (8) with nut and screw.
	GO TO FRAME 4



14-3. COMMANDER'S CONTROL HANDLE ADJUSTMENT PROCEDURE (CONT)

FRAME 4

Step	Procedure
1.	Check movement of trigger (1) and override actuator (2) and listen for click. **NOTE** If trigger and override actuator movement is good, omit step 2 and go to step 3.
2.	Make adjustments if necessary (para 14-15, frame 5).
3.	When adjustments are complete, remove elevating and traversing protractors (para 14-2, frame 6). END OF TASK



14-4. COMMANDER'S CONTROL HANDLE DISASSEMBLY PROCEDURE

PERSONNEL: One

REFERENCES: TM 9-2350-257-20-2-3 for procedure to remove commander's control handle

EQUIPMENT CONDITION: Commander's control handle removed (TM-20-2-3)

PRELIMINARY PROCEDURES: Test commander's control handle (para 14-2)

FRAME 1

Step	Procedure
1.	Remove elevation arm and plunger (para 14-6).
2.	Remove traverse arm (para 14-8).
3.	Remove grip (para 14-12).
4.	Remove housing and bracket (para 14-16).
5.	Disassemble traverse arm (para 14-10).
6.	Disassemble housing (para 14-18).
7.	Disassemble grip (para 14-14).
	END OF TASK

14-5. COMMANDER'S CONTROL HANDLE ASSEMBLY PROCEDURE

PERSONNEL: One

FRAME 1

Step	Procedure
1.	Assemble housing (para 14-19).
2.	Assemble grip (para 14-15).
3.	Assemble traverse arm (para 14-11).
4.	Install bracket (para 14-17).
5.	Install grip (para 14-13).
6.	Install traverse arm (para 14-9).
7.	Install elevation arm and plunger (para 14-7).
	NOTE Follow-on Maintenance Action Required: Test commander's control handle (para 14-2).
	END OF TASK

14-6. ELEVATION ARM AND PLUNGER REMOVAL PROCEDURE

TOOLS: 5/16" socket (3/8" drive)
3/8" drive ratchet
3/8" combination wrench (two)
1/2" combination wrench
5/16" combination wrench
1/4" drive pin punch
8 oz. ball peen hammer
Scraper
Stiff bristled brush
Fine stone

SUPPLIES: Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

PERSONNEL: One

REFERENCES: TM 9-2350-257-20-2-3 for procedure to remove commander's control handle
JPG for procedures to:
Clean parts
Inspect and repair parts

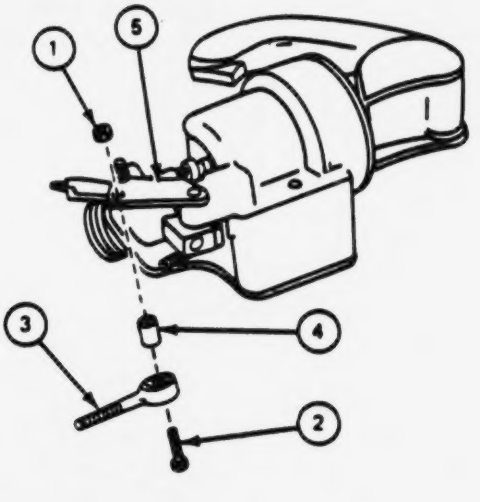
EQUIPMENT CONDITION: Commander's control handle removed (TM-20-2-3)

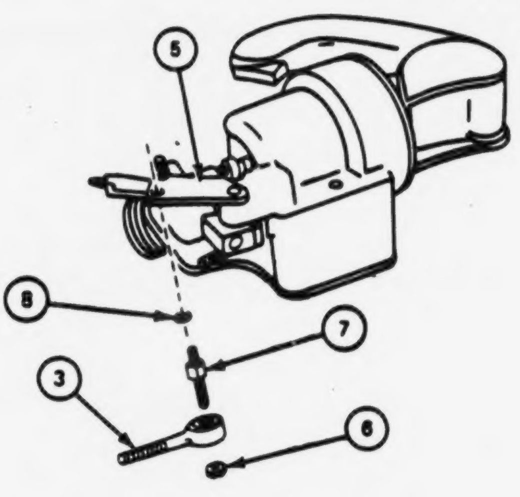
PRELIMINARY PROCEDURES: Test commander's control handle (para 14-2)

14-6. ELEVATION ARM AND PLUNGER REMOVAL PROCEDURE (CONT)

FRAME 1

Step	Procedure
	NOTE If nut (1) and screw (2) are used to attach rod end (3) and spacer (4) to elevation arm (5), do step 1. Otherwise, do steps 2 and 3.
1.	Using 5/16" and 3/8" combination wrenches, remove nut (1) and screw (2) attaching rod end (3) and spacer (4) to elevation arm (5).
2.	Using two 3/8" combination wrenches, remove nut (6) attaching rod end (3) to stud (7).
3.	Using 3/8" combination wrench, remove stud (7) and lockwasher (8) from elevation arm (5). GO TO FRAME 2

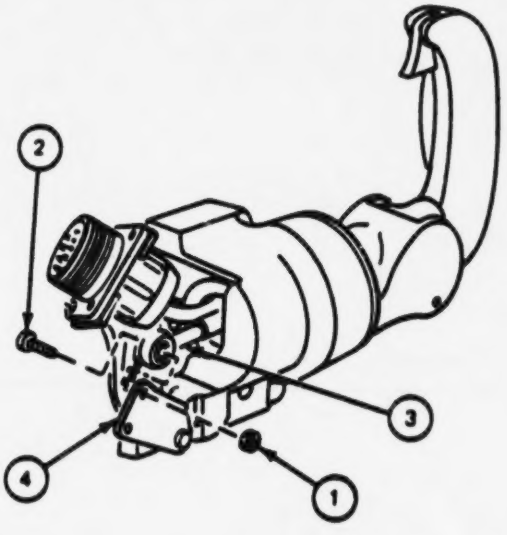


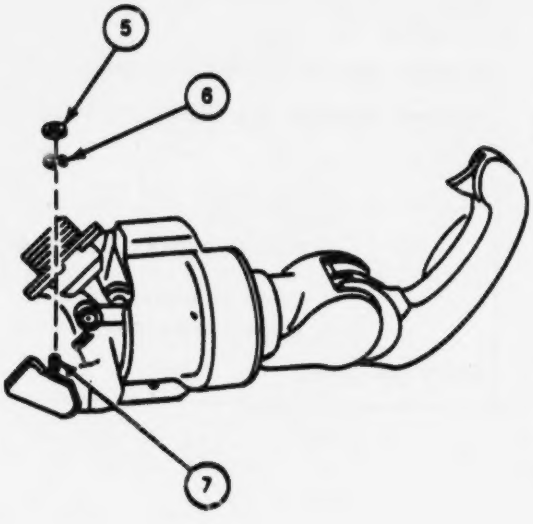


14-6. ELEVATION ARM AND PLUNGER REMOVAL PROCEDURE (CONT)

FRAME 2

Step	Procedure
1.	Using socket wrench and 3/8" combination wrench, remove nut (1) and screw (2) attaching rod end (3) to elevation arm (4).
2.	Using 1/2" combination wrench, remove nut (5) and lockwasher (6) from threaded pin (7).
	GO TO FRAME 3

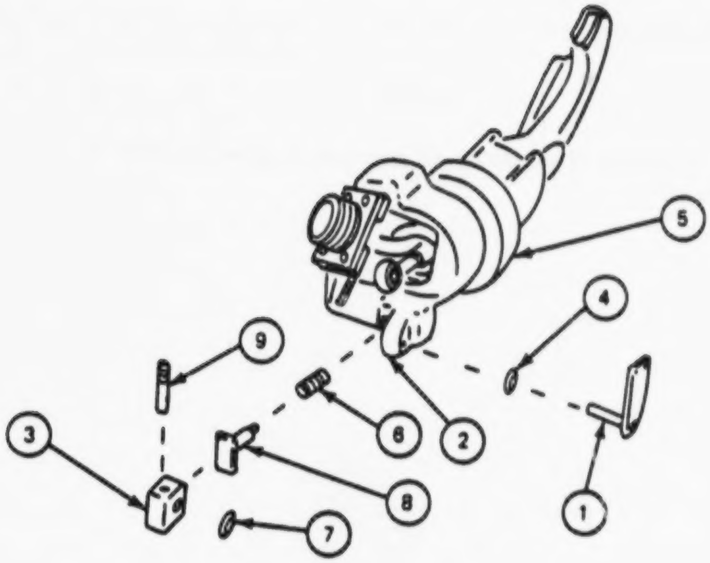




14-6. ELEVATION ARM AND PLUNGER REMOVAL PROCEDURE (CONT)

FRAME 3

Step	Procedure
	WARNING Cam lock block (3) is under spring pressure. Be careful when removing elevation arm (1) that parts do not fly out and hit you.
1.	Using punch and hammer, lightly tap shaft of elevation arm (1) just enough to move elevation arm away from housing lug (2).
2.	Using one hand, hold cam lock block (3) in place and remove elevation arm (1) and spacer (4).
3.	Slowly let cam lock block (3) come out of housing (5) until there is no more pressure on spring (6).
4.	Remove cam lock block (3), spacer (7), plunger (8), and spring (6).
5.	Remove threaded pin (9) from cam lock block (3).
	NOTE Follow-on Maintenance Action Required: Clean all parts (JPG). Inspect and repair all parts (JPG).
	END OF TASK



14-7. ELEVATION ARM AND PLUNGER INSTALLATION PROCEDURE

TOOLS: 5/16" combination wrench
5/16" socket (3/8" drive)
3/8" drive ratchet
3/8" combination wrench (two)
8 ounce ball peen hammer

SUPPLIES: Grease (item 12, App. A)

PERSONNEL: One

REFERENCES: JPG for procedure to apply grease

EQUIPMENT CONDITION: Install grip (para 14-13)

GENERAL INSTRUCTIONS:

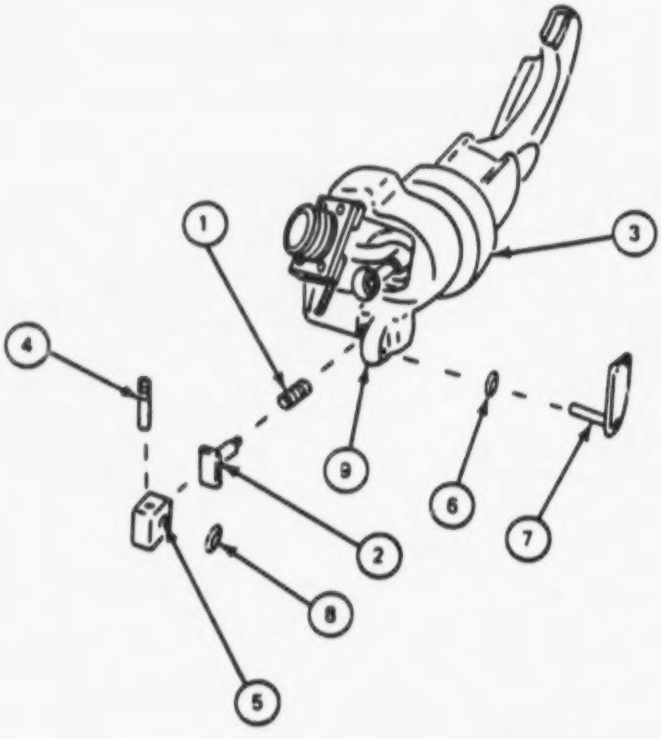
NOTE

Put a coating of grease on all mechanical parts that turn or slide (JPG).

14-7. ELEVATION ARM AND PLUNGER INSTALLATION PROCEDURE (CONT)

FRAME 1

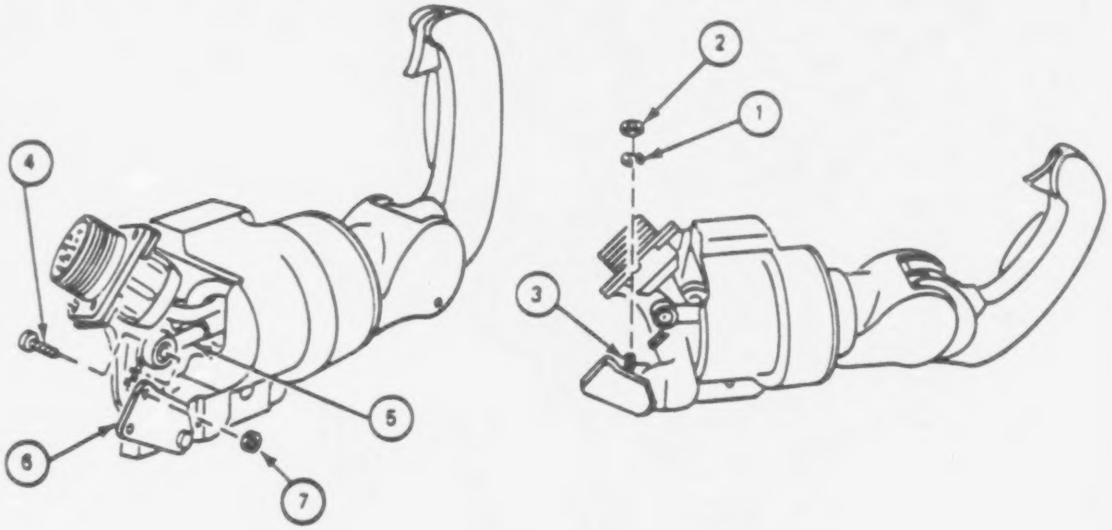
Step	Procedure
1.	Using hand, put spring (1) and plunger (2) into hole in housing (3) and hold spring pressed together.
2.	Put threaded pin (4) into cam lock block (5). Line up notch in threaded pin (4) with hole in cam lock block (5).
3.	Put spacer (6) on shaft of elevation arm (7).
4.	Put spacer (8) between cam lock block (5) and housing lug (9).
5.	Using hammer, carefully tap shaft of elevation arm (7) through lug (9), spacer (8), cam lock block (5), and threaded pin (4). GO TO FRAME 2



14-7. ELEVATION ARM AND PLUNGER INSTALLATION PROCEDURE (CONT)

FRAME 2

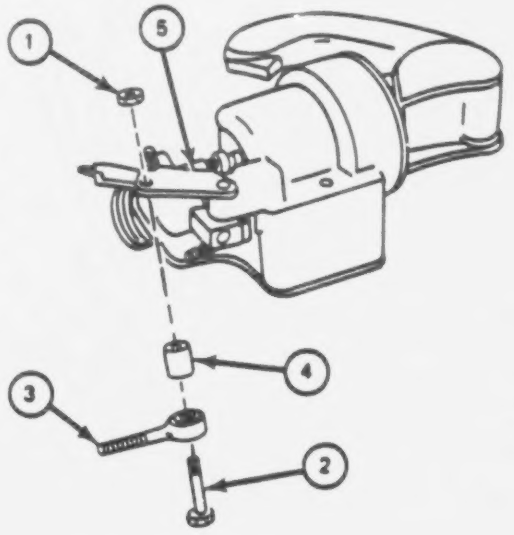
Step	Procedure
1.	Put lockwasher (1) and nut (2) on threaded pin (3). (Do not tighten.)
2.	Using socket wrench, put screw (4) through rod end bearing (5) and into threaded hole in elevation arm (6).
3.	Using 3/8" combination wrench, put nut (7) on screw (4). GO TO FRAME 3

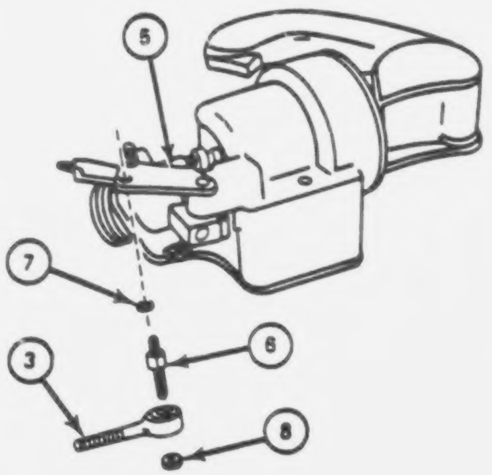


14-7. ELEVATION ARM AND PLUNGER INSTALLATION PROCEDURE (CONT)

FRAME 3

Step	Procedure
	NOTE If a nut (1) and screw (2) are used to attach rod end (3) and spacer (4) to elevation arm (5), do step 1. Otherwise, do steps 2 and 3.
1.	Using 5/16" and 3/8" combination wrenches, attach rod end (3) and spacer (4) to elevation arm (5) with screw (2) and nut (1).
2.	Using 3/8" combination wrench, attach stud (6) and lockwasher (7) to elevation arm (5).
3.	Using two 3/8" combination wrenches, attach rod end (3) to stud (6) with nut (8).
	NOTE Do following if this procedure completes maintenance of commander's control handle. Follow-on Maintenance Action Required: Test commander's control handle (para 14-2).
	END OF TASK





14-8. TRAVERSE ARM REMOVAL PROCEDURE

TOOLS: 1/4" flat tip screwdriver

PERSONNEL: One

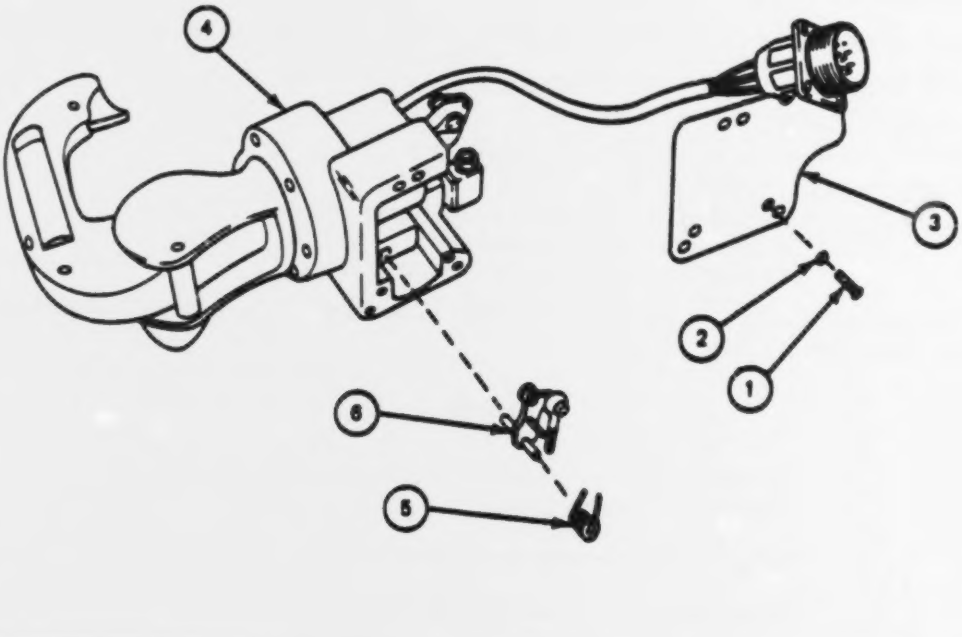
REFERENCES: TM 9-2350-257-20-2-3 for procedure to remove commander's control handle

EQUIPMENT CONDITION: Commander's control handle removed (TM-20-2-3)

PRELIMINARY PROCEDURES: Test commander's control handle (para 14-2)

FRAME 1

Step	Procedure
1.	Using screwdriver, remove three screws (1) and three lockwashers (2) attaching housing cover (3) to housing (4). Pull housing cover away from housing.
2.	Using hand, remove centering spring (5) and traverse arm (6) from housing (4). END OF TASK



14-9. TRAVERSE ARM INSTALLATION PROCEDURE

TOOLS: 1/4" flat tip screwdriver

SUPPLIES: Grease (item 12, App. A)

PERSONNEL: One

REFERENCES: JPG for procedure to apply grease

PRELIMINARY PROCEDURES: Assemble traverse arm (para 14-11)
Install housing and bracket (para 14-17)

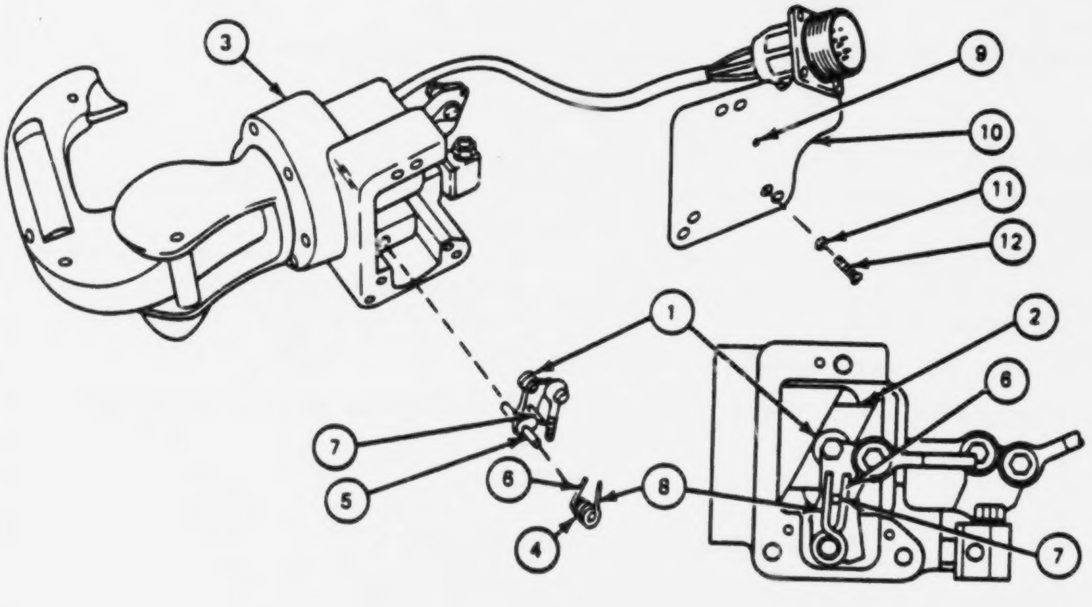
GENERAL INSTRUCTIONS:

NOTE

Put light coating of grease on all parts of traverse arm that turn or slide (JPG).

FRAME 1

Step	Procedure
1.	Line up bearing (1) on traverse arm with traversing cam slot (2) and put traverse arm into housing (3).
2.	Put centering spring (4) on pin (5) of traverse arm.
3.	Hook extended end (6) of centering spring (4) on right side of pin (7).
4.	Hook extended end (8) of centering spring (4) on left side of pin (7). **NOTE** The spring anchor pin (9) in housing cover (10) must be placed between extended ends (6) and (8) of spring (4) when attaching housing cover to housing (3).
5.	Using screwdriver, attach housing cover (10) to housing (3) with three lockwashers (11) and three screws (12). **NOTE** Do following if this procedure completes maintenance of commander's control handle. Follow-on Maintenance Action Required: Test commander's control handle (para 14-2). END OF TASK



14-10. TRAVERSE ARM DISASSEMBLY PROCEDURE

TOOLS: 3/8" socket (3/8" drive)
3/8" drive ratchet
5/16" socket (3/8" drive)
Scraper
Stiff bristled brush
Fine stone

SUPPLIES: Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

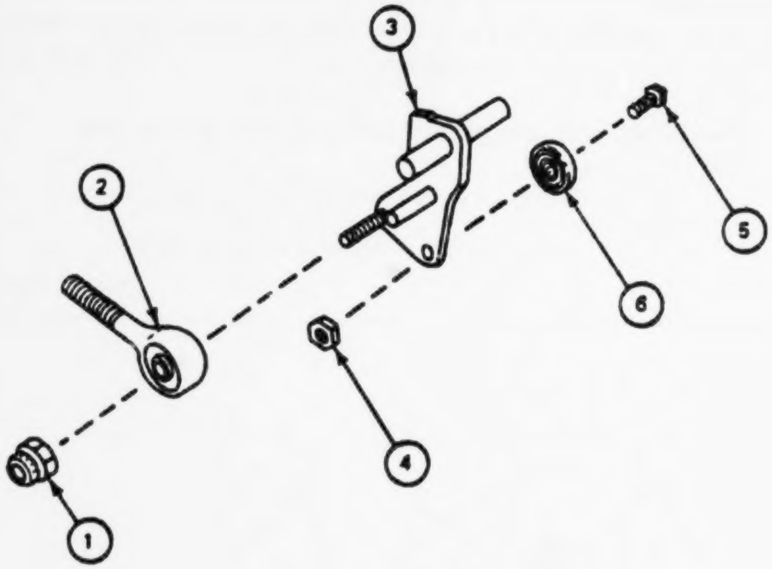
PERSONNEL: One

REFERENCES: JPG for procedures to:
Clean parts
Inspect and repair parts

PRELIMINARY PROCEDURES: Test commander's control handle (para 14-2)
Remove traverse arm (para 14-8)

FRAME 1

Step	Procedure
1.	Using 3/8" socket wrench, remove nut (1) attaching rod end (2) to traverse arm (3). Remove rod end.
2.	Using 3/8" socket wrench, remove nut (4).
3.	Using 5/16" socket wrench, remove screw (5) and bearing (6) from traverse arm (3).
	NOTE Follow-on Maintenance Action Required: Clean all parts (JPG). Inspect and repair all parts (JPG).
	END OF TASK



14-11. TRAVERSE ARM ASSEMBLY PROCEDURE

TOOLS:
5/16" socket (3/8" drive)
3/8" socket (3/8" drive)
3/8" drive ratchet

SUPPLIES:
Thread sealing compound (item 28, App. A)
Grease (item 12, App. A)

PERSONNEL: One

REFERENCES: JPG for procedures to:
- Use thread sealing compound
- Apply grease

GENERAL INSTRUCTIONS:

NOTE

During assembly, put grease on all parts that turn or slide (JPG).

14-11. TRAVERSE ARM ASSEMBLY PROCEDURE (CONT)

FRAME 1

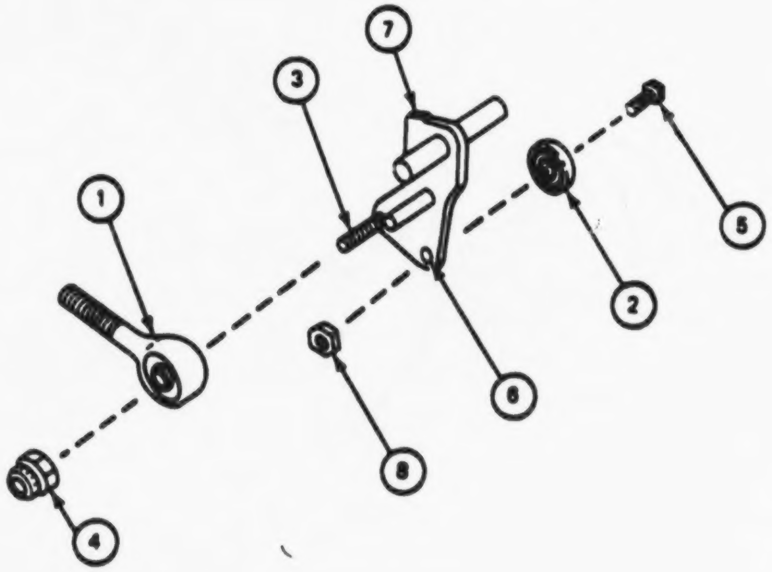
Step	Procedure
1.	Using hand, apply coating of grease to rod end bearing (1) and bearing (2) (JPG).
2.	Put thread sealing compound on threads of stud (3) (JPG).
3.	Using 3/8" socket wrench, attach rod end (1) to stud (3) with nut (4).
4.	Put bearing (2) on screw (5).
5.	Using 5/16" socket wrench, put screw (5) in threaded hole (6) of traverse arm (7).
6.	Put thread sealing compound on threads of screw (5) (JPG).
7.	Using 3/8" socket wrench, tighten nut (8) attaching bearing (2) and screw (5) to traverse arm (7).

NOTE

Follow-on Maintenance Action Required:

Install traverse arm (para 14-9).

END OF TASK



14-12. GRIP AND HARNESS REMOVAL PROCEDURE

TOOLS: 1/4" flat tip screwdriver
3/8" socket (3/8" drive)
3/8" drive ratchet
3/8" combination wrench
1/4" drive pin punch
1/16" socket head screw key (Allen wrench)
Slip joint pliers with plastic jaws
Soldering iron
8 ounce ball peen hammer

SUPPLIES: Masking tape (item 36, App. A)
Pen

PERSONNEL: One

REFERENCES: TM 9-2350-257-20-2-3 for procedure to remove commander's control handle
JPG for procedures to:
Use soldering iron
Tag electrical wires

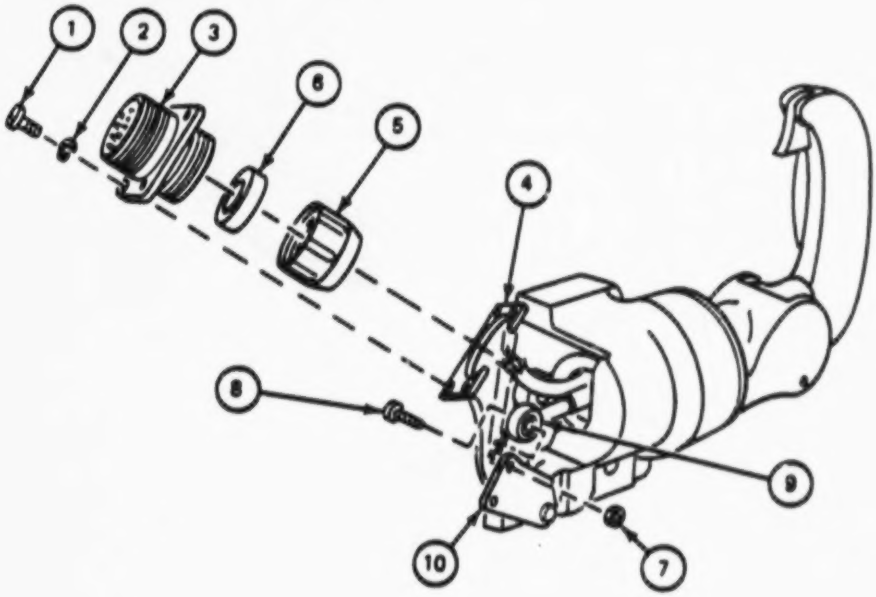
EQUIPMENT CONDITION: Commander's control handle removed (TM-20-2-3)

PRELIMINARY PROCEDURES: Test commander's control handle (para 14-2)

14-12. GRIP AND HARNESS REMOVAL PROCEDURE (CONT)

FRAME 1

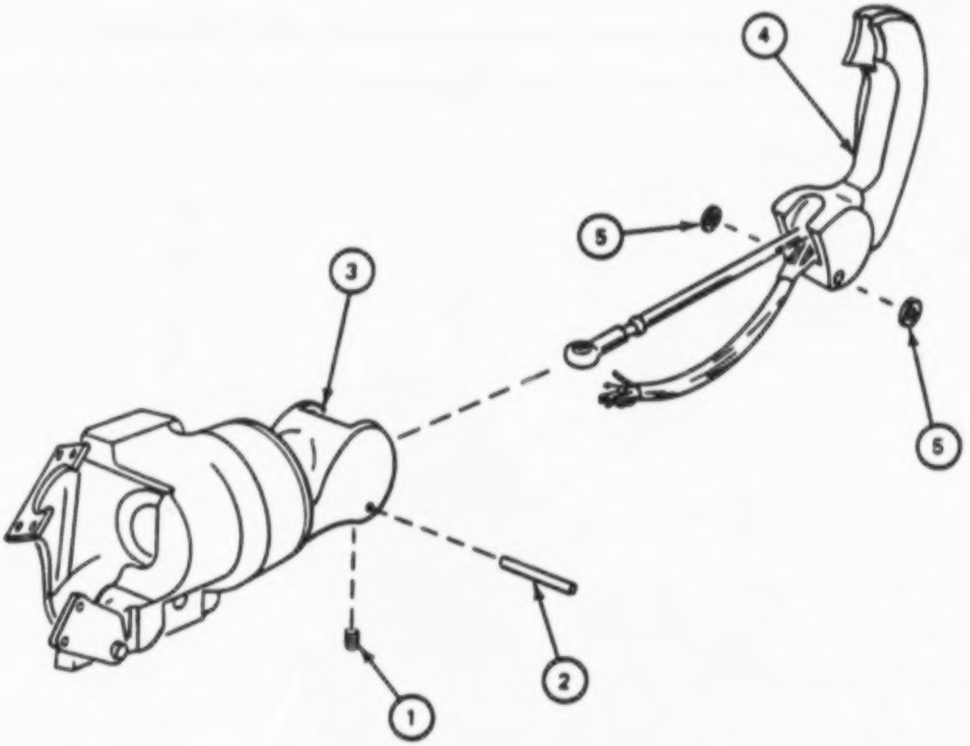
Step	Procedure
1.	Using screwdriver, remove four screws (1) and four lockwashers (2) attaching electrical connector (3) to housing cover (4).
2.	Using pliers, unscrew nut (5) from electrical connector (3).
3.	Using hand, pull nut (5) and grommet (6) away from electrical connector (3).
4.	Using masking tape and pen, tag each electrical lead connected to electrical connector (3) (JPG).
5.	Using soldering iron, unsolder electrical leads from electrical connector (3) pins (JPG).
6.	Remove grommet (6) and nut (5) from harness.
7.	Using socket wrench and combination wrench, remove nut (7) and screw (8) attaching rod end (9) to elevation arm (10).
	GO TO FRAME 2



14-12. GRIP AND HARNESS REMOVAL PROCEDURE (CONT)

FRAME 2

Step	Procedure
1.	Using Allen wrench, remove setscrew (1) that holds pivot shaft (2) in bracket (3).
2.	Using drift punch and hammer, drive pivot shaft (2) out of bracket (3).
3.	Remove grip (4) (with rod and harness) and spacers (5) from bracket (3). Note number of spacers removed so that the same number are used when attaching grip to bracket. END OF TASK



14-13. GRIP AND HARNESS INSTALLATION PROCEDURE

TOOLS: 1/16" socket head screw key (Allen wrench)
Feeler gauge
1/4" flat tip screwdriver
Soldering iron
Slip joint pliers with plastic jaws
3/8" socket (3/8" drive)
3/8" drive ratchet
3/8" combination wrench
8 ounce ball peen hammer

SUPPLIES: Grease (item 12, App. A)
Solder (item 31, App. A)

PERSONNEL: One

REFERENCES: JPG for procedures to:
Use soldering iron
Apply grease

PRELIMINARY PROCEDURES: Assemble grip (para 14-15)
Install housing and bracket (para 14-17)
Install traverse arm (para 14-9)

GENERAL INSTRUCTIONS:

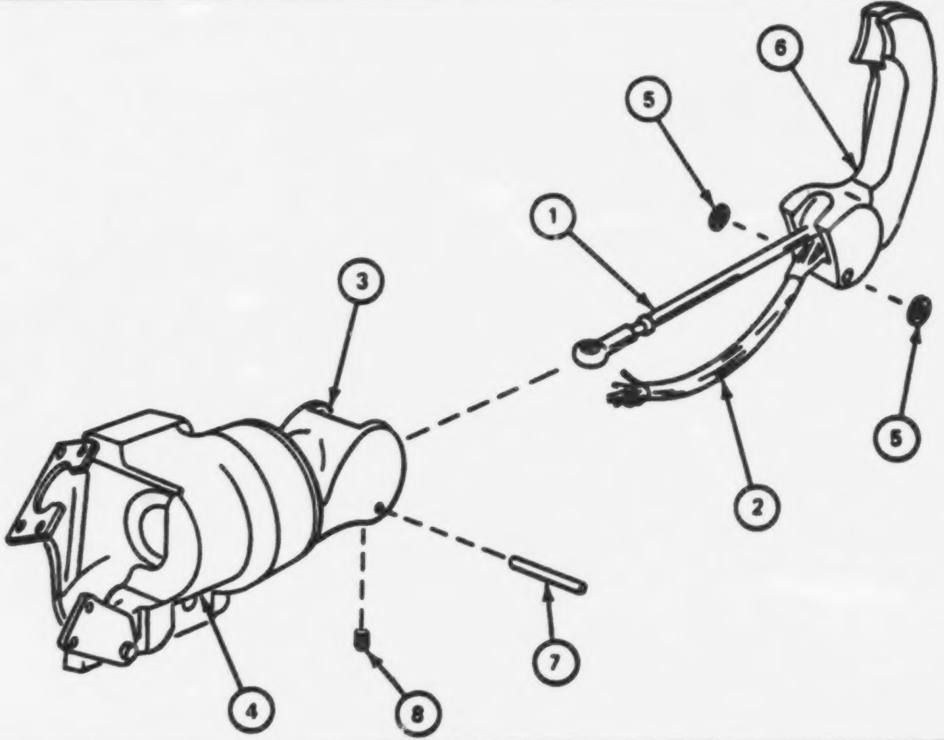
NOTE

Put coating of grease on all mechanical parts that turn or slide (JPG).

14-13. GRIP AND HARNESS INSTALLATION PROCEDURE (CONT)

FRAME 1

Step	Procedure
1.	Put rod (1) and harness (2) into bracket (3) and housing (4).
2.	Put spacers (5) between bracket (3) and grip (6). Using feeler gauge, check for 0.003" to 0.008" clearance between bracket (3) and each side of grip (6). Add spacers as required to get this clearance.
	NOTE Pivot shaft (7) has a groove with a flat surface on one end. This must be lined up with hole for setscrew in hub of bracket (3).
3.	Put a coating of grease on pivot shaft (7) (JPG).
4.	Using hammer, carefully tap pivot shaft (7) through bracket (3) hole, spacer (5), and grip (6).
5.	Using Allen wrench, put setscrew (8) into hole in bracket (3).
	GO TO FRAME 2



14-13. GRIP AND HARNESS INSTALLATION PROCEDURE (CONT)

FRAME 2

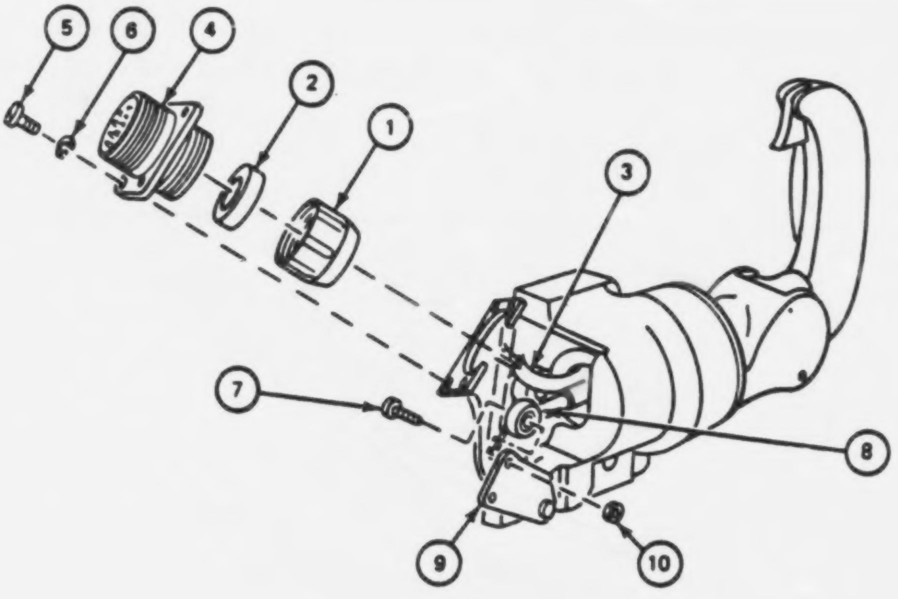
Step	Procedure
1.	Place electrical connector nut (1) and grommet (2) on electrical harness leads (3).
2.	Using soldering iron, solder harness leads to pins of electrical connector (4) (JPG).
3.	Remove tags from leads.
4.	Using pliers, put nut (1) on electrical connector (4).
5.	Using screwdriver, attach electrical connector (4) to housing cover with four screws (5) and four lockwashers (6).
6.	Put screw (7) through rod end (8) and hole in elevation arm (9).
7.	Put nut (10) on screw (7).
8.	Using socket wrench and combination wrench, tighten nut (10) on screw (7).

NOTE

Follow-on Maintenance Action Required:

Test commander's control handle (para 14-2).

END OF TASK



14-14. GRIP DISASSEMBLY AND SWITCH REMOVAL PROCEDURE

TOOLS: 3/16" flat tip screwdriver
3/16" drive pin punch
8 ounce ball peen hammer
3/32" socket head screw key (Allen wrench)
5/32" socket head screw key (Allen wrench)
1/16" drive pin punch
Scraper
Stiff bristled brush
Fine stone

SUPPLIES: Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

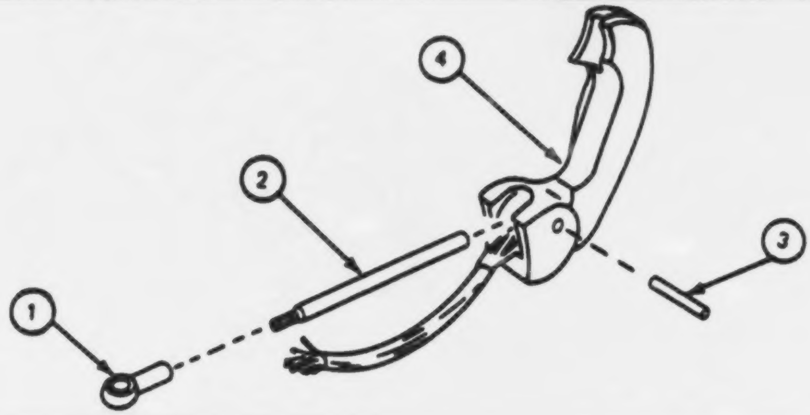
PERSONNEL: One

REFERENCES: JPG for procedures to:
Clean parts
Inspect and repair parts

PRELIMINARY PROCEDURES: Test commander's control handle (para 14-2)
Remove grip (para 14-12)

FRAME 1

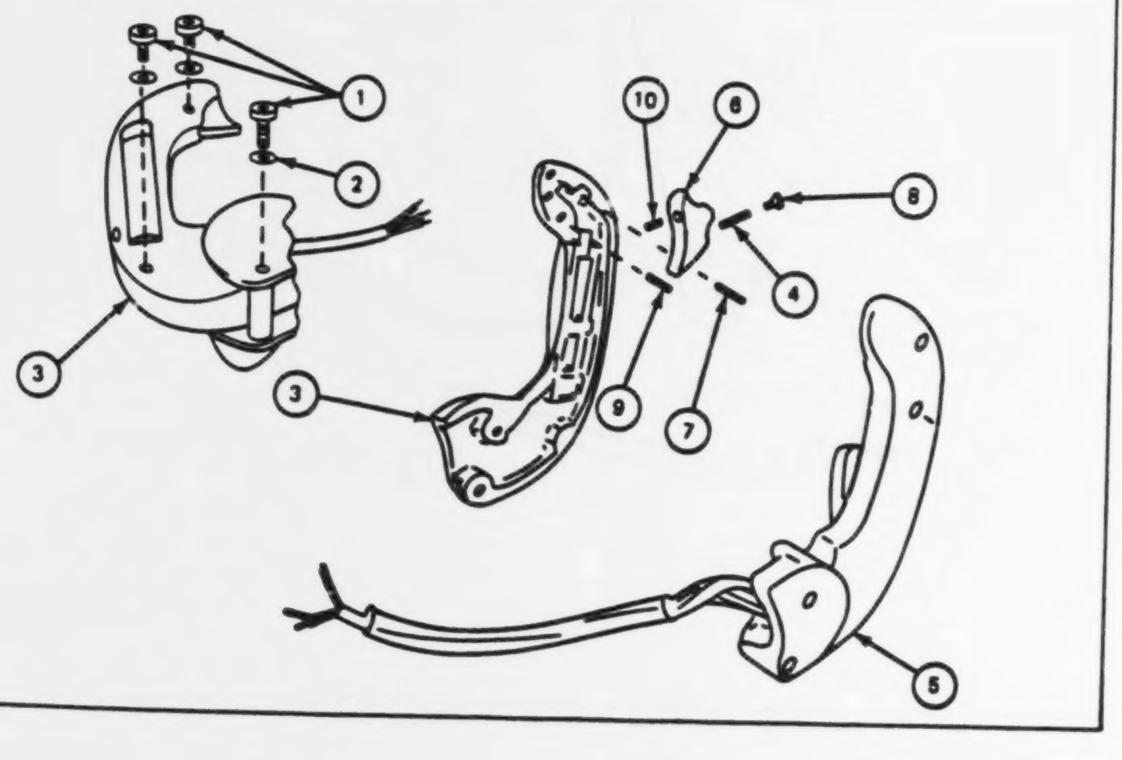
Step	Procedure
1.	Using hands, remove rod end (1) from control rod (2).
2.	Using 3/16" punch and hammer, remove pivot pin (3) attaching control rod (2) to grip (4).
3.	Remove control rod (2) from grip (4). GO TO FRAME 2



14-14. GRIP DISASSEMBLY AND SWITCH REMOVAL PROCEDURE (CONT)

FRAME 2

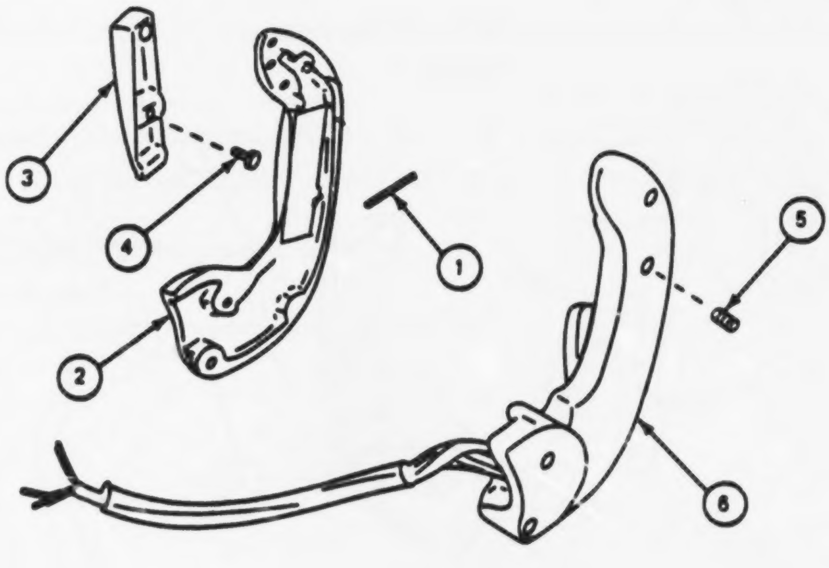
Step	Procedure
1.	Using 5/32" Allen wrench, remove three screws (1) and three lockwashers (2) from right half of grip (3). **NOTE** When separating two halves of grip, use care to prevent spring (4) and trigger pivot pin (7) from flying out and becoming lost.
2.	Separate grip into a right half (3) and a left half (5).
3.	Carefully remove trigger (6) from trigger pivot pin (7).
4.	Remove trigger return spring (4) and pin (8) from trigger (6).
5.	Using 1/16" punch and hammer, remove trigger pivot pin (7) from grip half (3).
6.	Using 1/16" punch and hammer, remove trigger stop pin (9) from grip half (3).
7.	Using 3/32" Allen wrench, remove setscrew (10) from trigger (6). GO TO FRAME 3



14-14. GRIP DISASSEMBLY AND SWITCH REMOVAL PROCEDURE (CONT)

FRAME 3

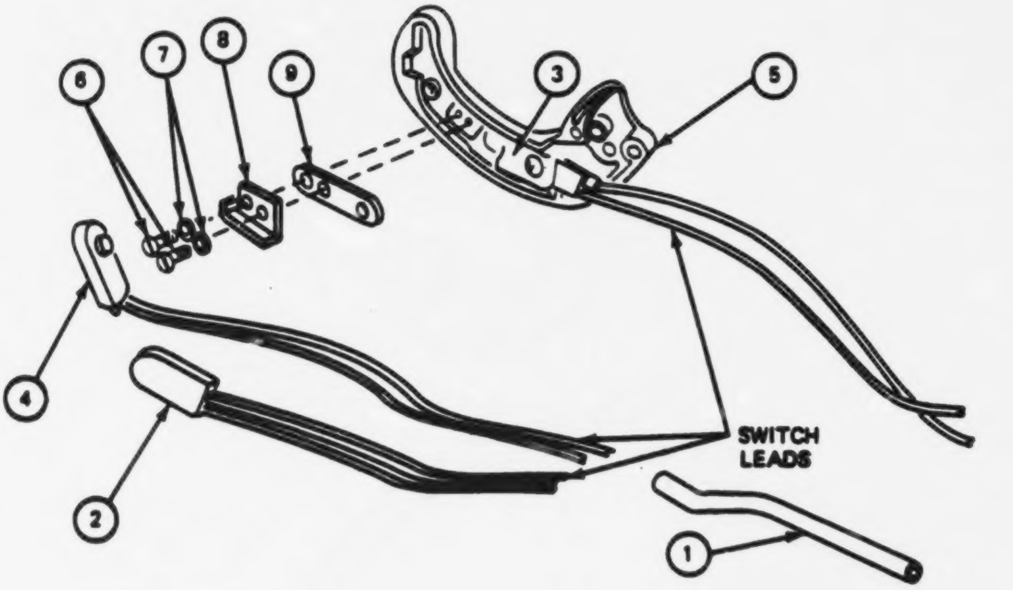
Step	Procedure
1.	Using 1/16" punch and hammer, remove actuator pivot pin (1) from right half of grip (2). Remove actuator (3). **NOTE** Setscrew (4) has a flat washer attached to its inside end and must be turned clockwise to remove without washer dropping off.
2.	Using 3/32" Allen wrench, remove setscrew (4) from inside of actuator (3).
3.	Using 3/32" Allen wrench, remove setscrew (5) from left half of grip (6). GO TO FRAME 4



14-14. GRIP DISASSEMBLY AND SWITCH REMOVAL PROCEDURE (CONT)

FRAME 4

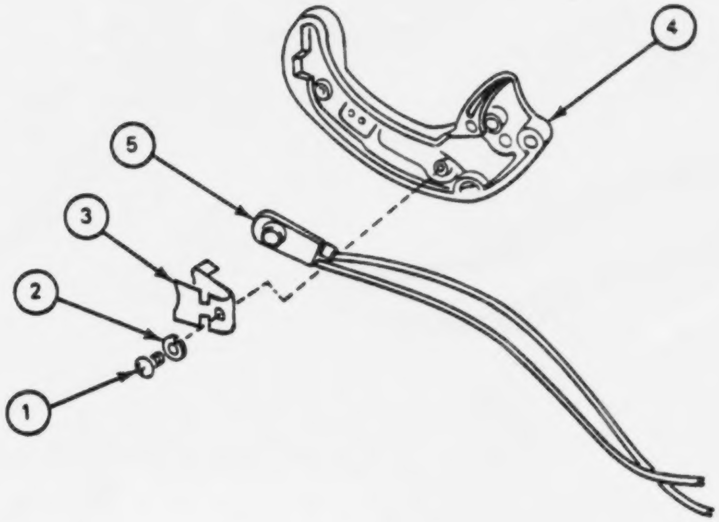
Step	Procedure
1.	Using hand, pull tubing (1) from switch leads.
2.	Using hand, remove override switch (2) from clip (3).
3.	Remove trigger switch (4) from grip half (5).
4.	Using screwdriver, remove two screws (6) and two lockwashers (7) attaching guard (8) and adapter (9) to grip half (5). Remove guard (8) and adapter (9).
	GO TO FRAME 5



14-14. GRIP DISASSEMBLY AND SWITCH REMOVAL PROCEDURE (CONT)

FRAME 5

Step	Procedure
1.	Using screwdriver, remove screw (1) and lockwasher (2) attaching clip (3) to grip half (4).
2.	Remove clip (3) and magnetic brake switch (5) from grip half (4).
	NOTE Follow-on Maintenance Action Required: Clean all parts (JPG). Inspect and repair all parts (JPG).
	END OF TASK



14-15. GRIP ASSEMBLY AND SWITCH INSTALLATION PROCEDURE

TOOLS: Center punch
3/16" flat tip screwdriver
3/32" socket head screw key (Allen wrench)
Machinist steel rule
8 ounce ball peen hammer
5/32" socket head screw key (Allen wrench)

SUPPLIES: Sealing compound (item 25, App. A)
Grease (item 12, App. A)

PERSONNEL: One

REFERENCES: JPG for procedures to:
Use sealing compound
Perform staking
Apply grease

GENERAL INSTRUCTIONS:

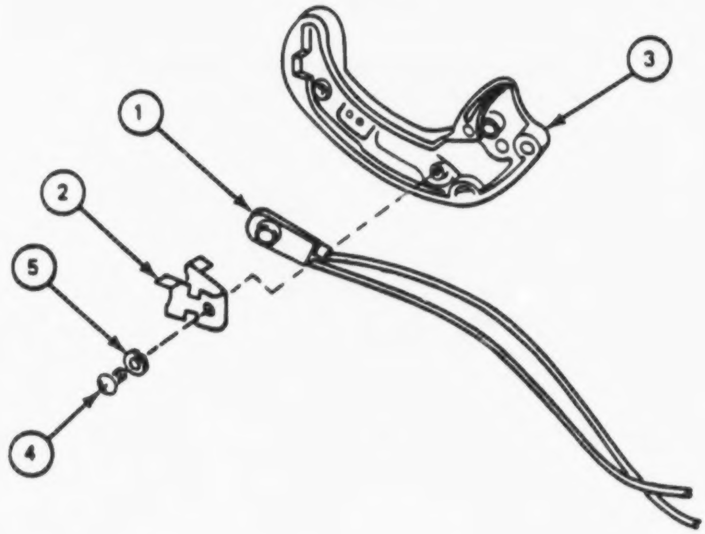
NOTE

During assembly, put a light coating of grease on all mechanical parts that turn or slide (JPG).

14-15. GRIP ASSEMBLY AND SWITCH INSTALLATION PROCEDURE (CONT)

FRAME 1

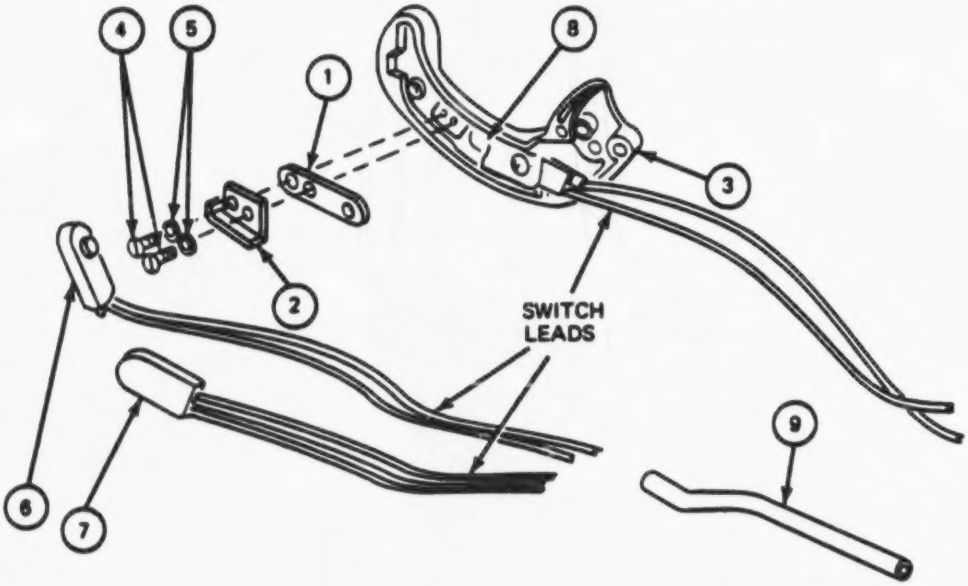
Step	Procedure
	NOTE Magnetic brake switch (1) has two shorter leads.
1.	Place magnetic brake switch (1) in clip (2).
2.	Using screwdriver, attach clip (2) to left half of grip (3) with screw (4) and lockwasher (5).
	GO TO FRAME 2



14-15. GRIP ASSEMBLY AND SWITCH INSTALLATION PROCEDURE (CONT)

FRAME 2

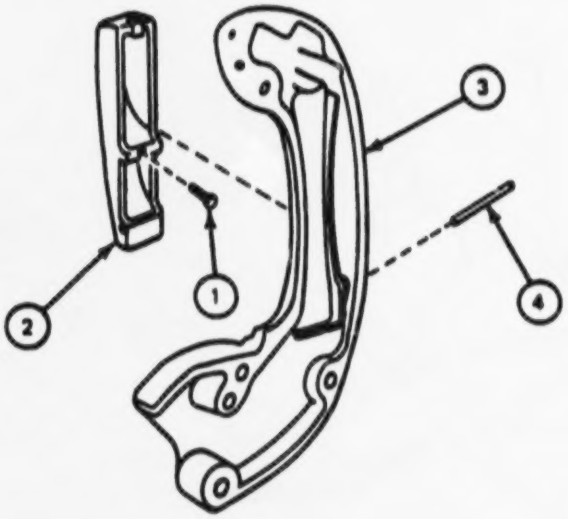
Step	Procedure
1.	Place adapter (1) and guard (2) in grip half (3).
2.	Using screwdriver, attach adapter (1) and guard (2) to grip half (3) with two screws (4) and two lockwashers (5).
3.	Place trigger switch (6) in grip half (3) and push electrical leads behind guard (2).
4.	Place override switch (7) in clip (8) with switch button facing adapter (1).
5.	Put tube (9) over switch electrical leads.
	GO TO FRAME 3



14-15. GRIP ASSEMBLY AND SWITCH INSTALLATION PROCEDURE (CONT)

FRAME 3

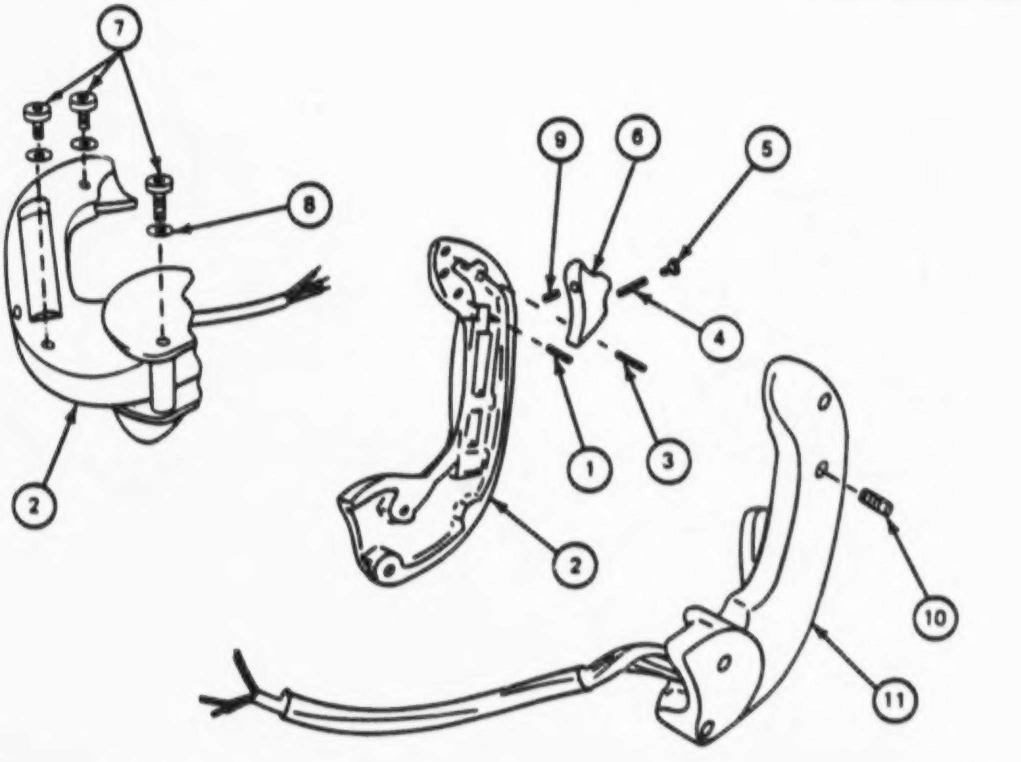
Step	Procedure
1.	Thread adjusting setscrew (1) into actuator (2) with washer end of setscrew on inside.
2.	Using 3/32" Allen wrench, turn setscrew (1) counterclockwise until washer contacts actuator (2).
3.	Place actuator (2) into right half of grip (3).
4.	Using hammer, put actuator pivot pin (4) through grip half (3) and actuator (2).
	GO TO FRAME 4



14-15. GRIP ASSEMBLY AND SWITCH INSTALLATION PROCEDURE (CONT)

FRAME 4

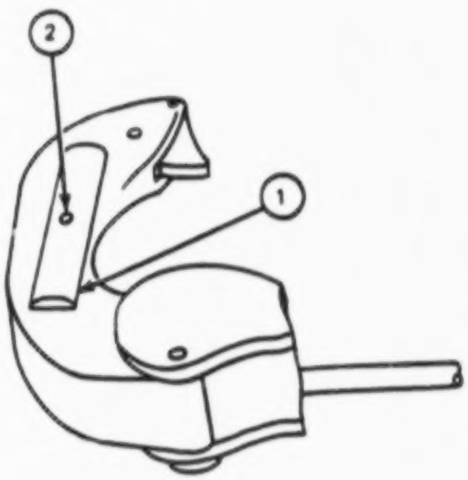
Step	Procedure
1.	Using hammer, put trigger stop pin (1) into right half of grip (2).
2.	Using hammer, put trigger pivot pin (3) into right half of grip (2).
3.	Put trigger return spring (4) and pin (5) into trigger (6).
4.	Place trigger (6) on trigger pivot pin (3) and push in and hold pin (5) in hole. Put one of screws (7) and washer (8) in hole to hold trigger spring (4) and pin (5) in place.
5.	Using 3/32" Allen wrench, put setscrew (9) into trigger (6).
6.	Using 3/32" Allen wrench, put setscrew (10) into left half of grip (11).
7.	Join grip halves (2) and (11), making sure all parts stay in place.
8.	Using 5/32" Allen wrench, put in three screws (7) and three lockwashers (8) holding grip halves together.
	GO TO FRAME 5

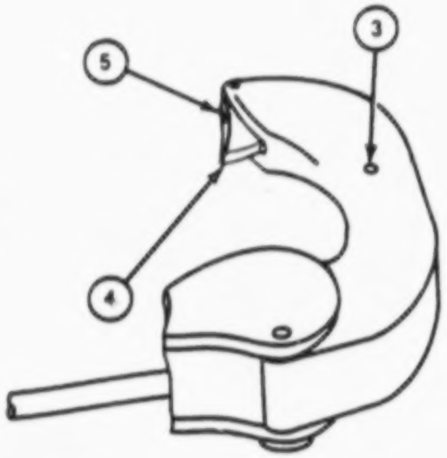


14-15. GRIP ASSEMBLY AND SWITCH INSTALLATION PROCEDURE (CONT)

FRAME 5

Step	Procedure
1.	Using 3/32" Allen wrench with actuator (1) fully out, turn setscrew (2) clockwise until override switch (located inside grip) clicks. Then turn setscrew (2) counterclockwise 3/4 to 1 turn.
2.	Using 3/32" Allen wrench while pressing and releasing actuator (1), turn setscrew (3) counterclockwise until both override switch and magnetic brake switches (located inside grip) clicks. Then turn setscrew (3) 1/3 turn farther.
3.	Using 3/32" Allen wrench while pressing and releasing trigger (4), turn setscrew (5) clockwise until trigger switch (located inside grip) will not click.
4.	Using 3/32" Allen wrench while pressing and holding trigger (4), turn setscrew (5) counterclockwise until trigger switch (located inside grip) clicks. Then turn setscrew (5) 1/5 turn farther. GO TO FRAME 6

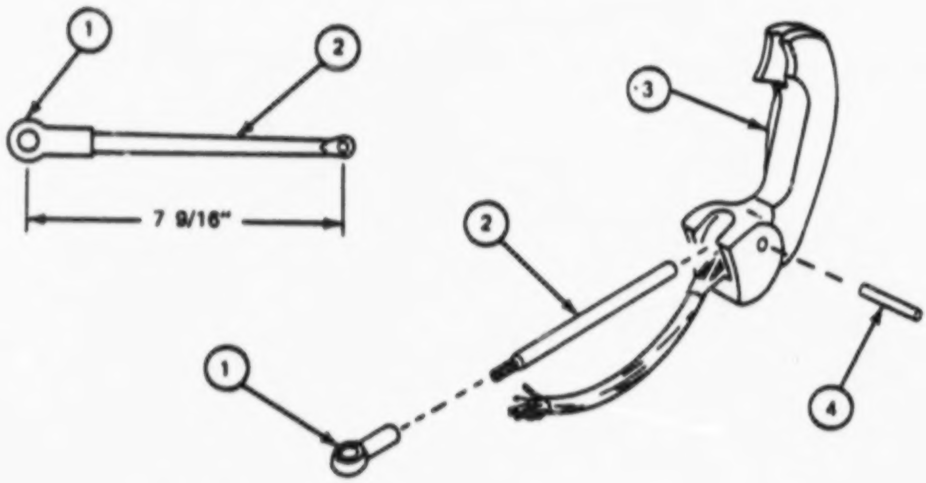




4-15. GRIP ASSEMBLY AND SWITCH INSTALLATION PROCEDURE (CONT)

FRAME 6

Step	Procedure
1.	Using hand, put rod end (1) on control rod (2).
2.	Using hand and rule, move rod end (1) to get a 7-9/16" measurement from center of rod end to center of pivot pin hole.
3.	Line up control rod (2) pivot pin hole with grip (3) pin hole.
4.	Using hammer, put pivot pin (4) through grip (3) and control rod (2).
5.	Using hammer and center punch, stake both ends of pivot pin (4) (JPG).
	NOTE Follow-on Maintenance Action Required: Install grip (para 14-13).
	END OF TASK



14-16. HOUSING AND BRACKET REMOVAL PROCEDURE

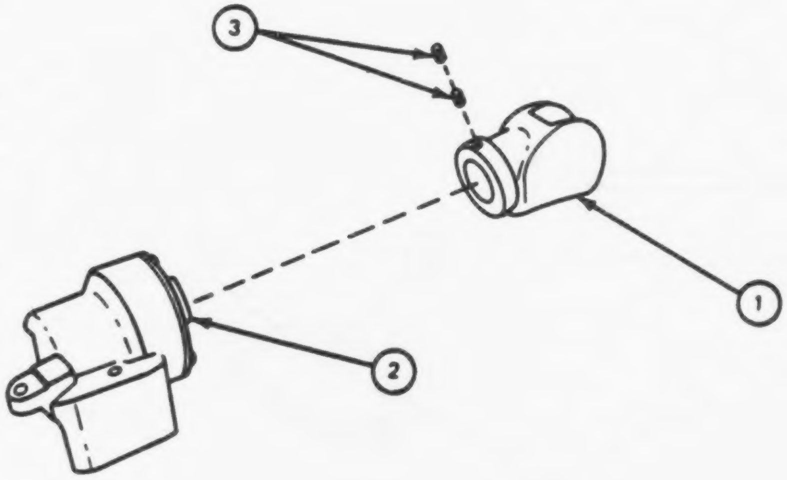
TOOLS: 3/32" socket head screw key (Allen wrench)
Machinist's scribe

PERSONNEL: One

PRELIMINARY PROCEDURES: Test commander's control handle (para 14-2)
Remove grip (para 14-12)

FRAME 1

Step	Procedure
1.	Using metal scribe, make line across bracket (1) and traversing cam (2) so that both parts can be lined up when they are installed.
2.	Using Allen wrench, remove six setscrews (3) (two from each hole) that hold bracket (1 to traversing cam (2).
3.	Remove bracket (1) from traversing cam (2).
	END OF TASK



14-17. HOUSING AND BRACKET INSTALLATION PROCEDURE

TOOLS: 3/32'' socket head screw key (Allen wrench)

PERSONNEL: One

PRELIMINARY PROCEDURES: Assemble housing (para 14-19)

FRAME 1

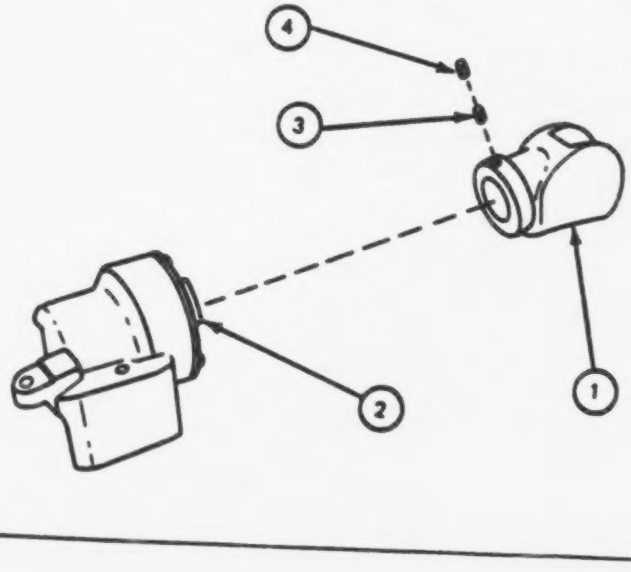
Step	Procedure
1.	Place bracket (1) on traversing cam (2).
2.	Line up mark on bracket (1) with mark on traversing cam (2) made during removal procedure.
3.	Using Allen wrench, attach bracket (1) to traversing cam (2) with three setscrews (3) (one in each threaded hole).
4.	Using Allen wrench, put three setscrews (4) in same threaded holes as setscrew (3). Do not tighten at this time because setscrew (4) may need to be removed during adjustment procedure (para 14-3).

NOTE

Follow-on Maintenance Action Required:

Install traverse arm (para 14-9).

END OF TASK



14-18. HOUSING DISASSEMBLY PROCEDURE

TOOLS: 1/4" flat tip screwdriver
1/4" drive pin punch
8 ounce ball peen hammer
Scraper
Stiff bristled brush
Fine stone

SUPPLIES: Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

PERSONNEL: One

REFERENCES: JPG for procedures to:
Clean parts
Inspect and repair parts

PRELIMINARY PROCEDURES: Test commander's control handle (para 14-2)
Remove traverse arm (para 14-8)
Remove grip (para 14-12)
Remove bracket (para 14-16)

14-18. HOUSING DISASSEMBLY PROCEDURE (CONT)

FRAME 1

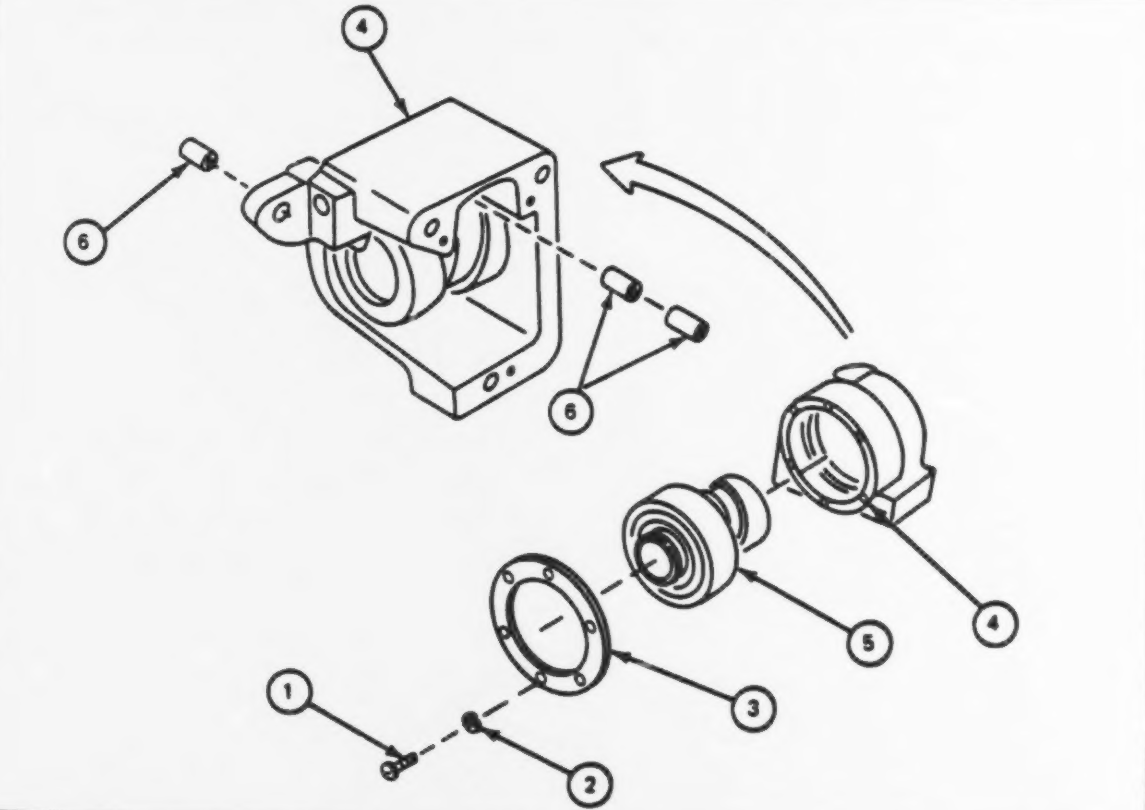
Step	Procedure
1.	Using screwdriver, remove six screws (1) and six lockwashers (2) attaching cam plate (3) to housing (4).
2.	Remove cam plate (3) and traversing cam with bearing (5) from housing (4).
3.	Using hammer and punch, carefully tap three bushings (6) out of housing (4).

NOTE

Follow-on Maintenance Action Required:

Clean all parts (JPG).
Inspect and repair all parts (JPG).
Repair bad bearing on traversing cam (para 14-20).

END OF TASK



14-19. HOUSING ASSEMBLY PROCEDURE

TOOLS: 1/4" flat tip screwdriver
Plastic face hammer

SUPPLIES: Grease (item 14, App. A)
Grease (item 12, App. A)

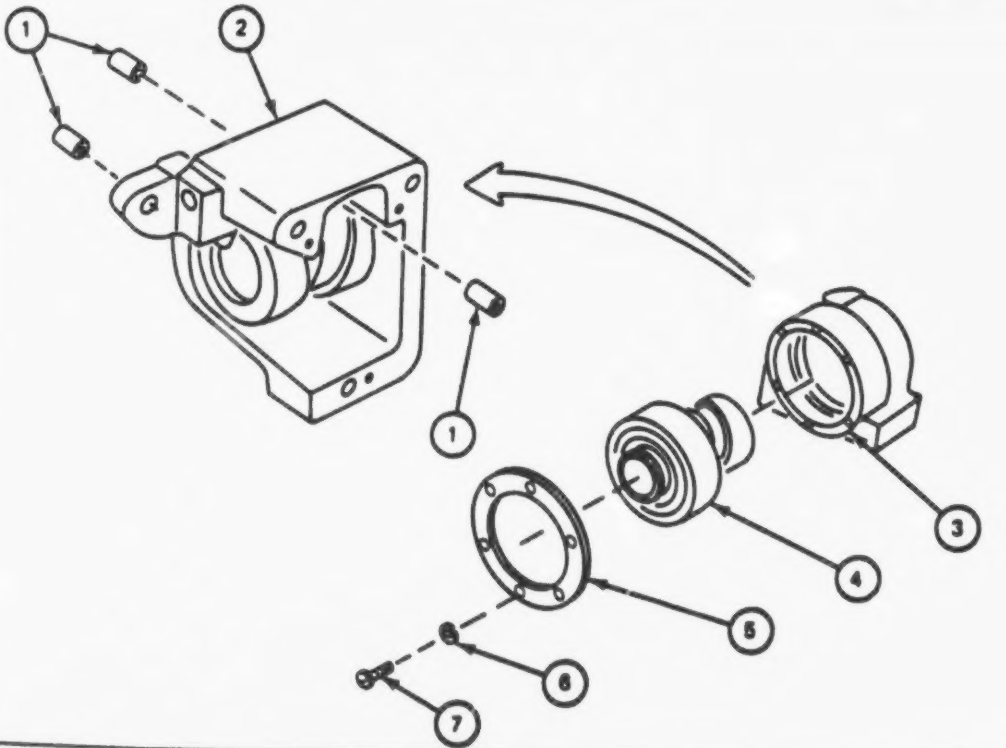
PERSONNEL: One

REFERENCES: JPG for procedure to apply grease

14-19. HOUSING ASSEMBLY PROCEDURE (CONT)

FRAME 1

Step	Procedure
1.	Using hammer, tap three bushings (1) all the way into holes in housing (2).
2.	Using hand, put a light coating of grease inside housing surface (3) and on traversing cam (4) (JPG).
3.	Using hand, lubricate cam bearing (3) with grease (JPG).
4.	Put traversing cam with cam bearing (4) into housing (2).
5.	Using screwdriver, attach cam plate (5) to housing (2) with six lockwashers (6) and six screws (7).
	NOTE
	Follow-on Maintenance Action Required:
	Install housing (para 14-17).
	END OF TASK



14-20. HOUSING REPAIR PROCEDURE

SUPPLIES: Bearing (713512)

PERSONNEL: One

PRELIMINARY PROCEDURES:
Test commander's control handle (para 14-2)
Remove housing (para 14-16)
Disassemble housing (para 14-18)

FRAME 1

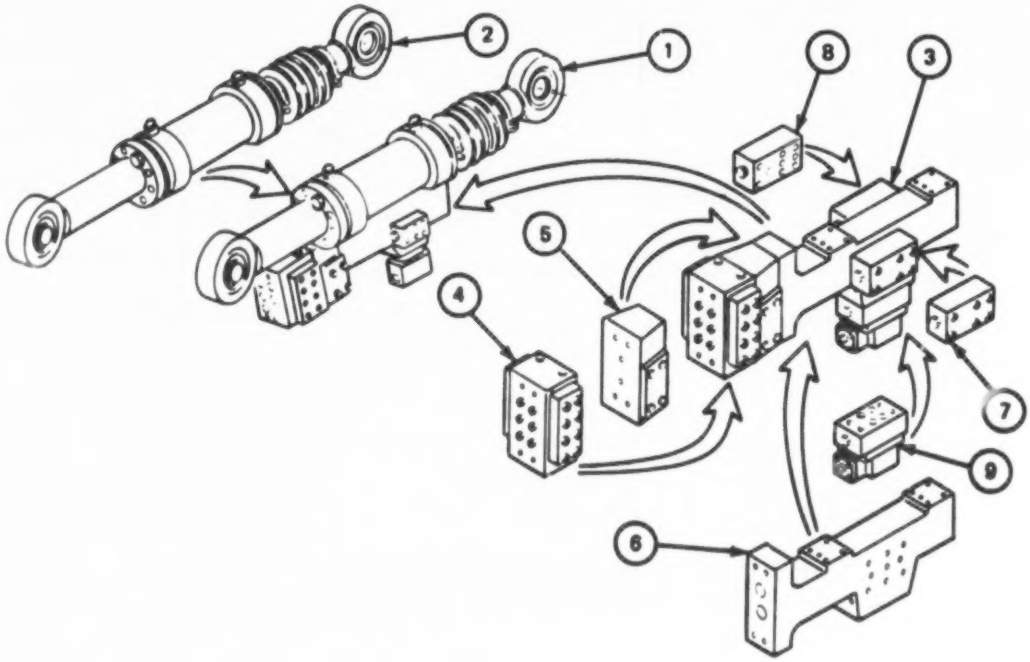
Step	Procedure
	SUPPORT SHOP WORK
1.	Take traversing cam (with bearing) and new bearing to shop where press equipment is available.
	a. Remove bad bearing from traversing cam.
	b. Install new bearing on traversing cam.
2.	After support shop work, return traversing cam (with bearing) to turret shop.
	END OF TASK

CHAPTER 15

ELEVATING MECHANISM

15-1. MAINTENANCE PROCEDURES INDEX

	TASKS						
Equipment Item	Inspection	Repair	Test	Removal	Installation	Disassembly	Assembly
1. Elevating Mechanism	. . .	. . .	15-2	. . .	. . .	15-3	15-4
2. Elevating Cylinder	15-5	15-8	. . .	15-3	15-4	15-6	15-7
3. Elevation Stabilizer Valve	. . .	. . .	. . .	15-9	15-10	15-11	15-12
4. Lock Valve	15-13	. . .	. . .	15-14	15-15	15-16	15-17
5. Relief Valve	15-18	. . .	. . .	15-14	15-15	15-19	15-20
6. Manifold	. . .	. . .	. . .	15-11	15-12	. . .	. . .
7. Left Pilot Check Valve	. . .	. . .	. . .	15-21	15-22	. . .	. . .
8. Right Pilot	. . .	. . .	. . .	15-23	15-24	. . .	. . .
9. Elevation Servovalve	. . .	. . .	. . .	15-25	15-26	. . .	. . .



15.2. ELEVATING MECHANISM TEST PROCEDURE

TEST EQUIPMENT: M3 oil pump
Pressure gauge (0 to 3000 psi)
Suitable fittings, lines and tools
Watch with sweep second hand

TOOLS: 3/4" combination wrench
3/8" combination wrench

SUPPLIES: Rags (item 21, App. A)

PERSONNEL: One

REFERENCES: TM 9-2350-257-20-2-3 for procedure to remove elevating mechanism
JPG for procedure to use M3 oil pump

EQUIPMENT CONDITION: Elevating mechanism removed (TM-20-2-3)

PRELIMINARY PROCEDURES: Assemble elevating mechanism (para 15-4)

GENERAL INSTRUCTIONS:

WARNING

Hydraulic fluid under pressure can hurt or kill you. This test is done with high pressure hydraulic fluid. Follow procedure carefully.

NOTE

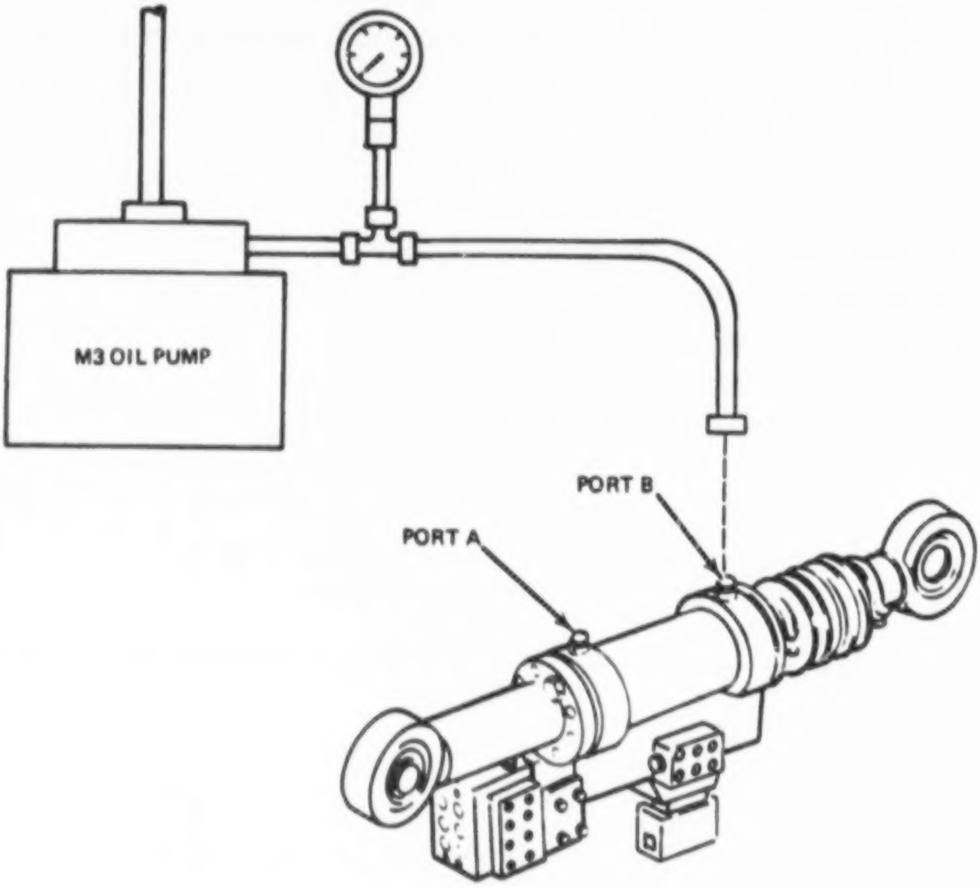
Suitable fittings, lines, and tools should be used to connect test equipment to parts being tested.

If normal indication is not obtained, elevating mechanism is bad. Disassemble bad elevating mechanism (para 15-3).

15-2. ELEVATING MECHANISM TEST PROCEDURE (CONT)

FRAME 1

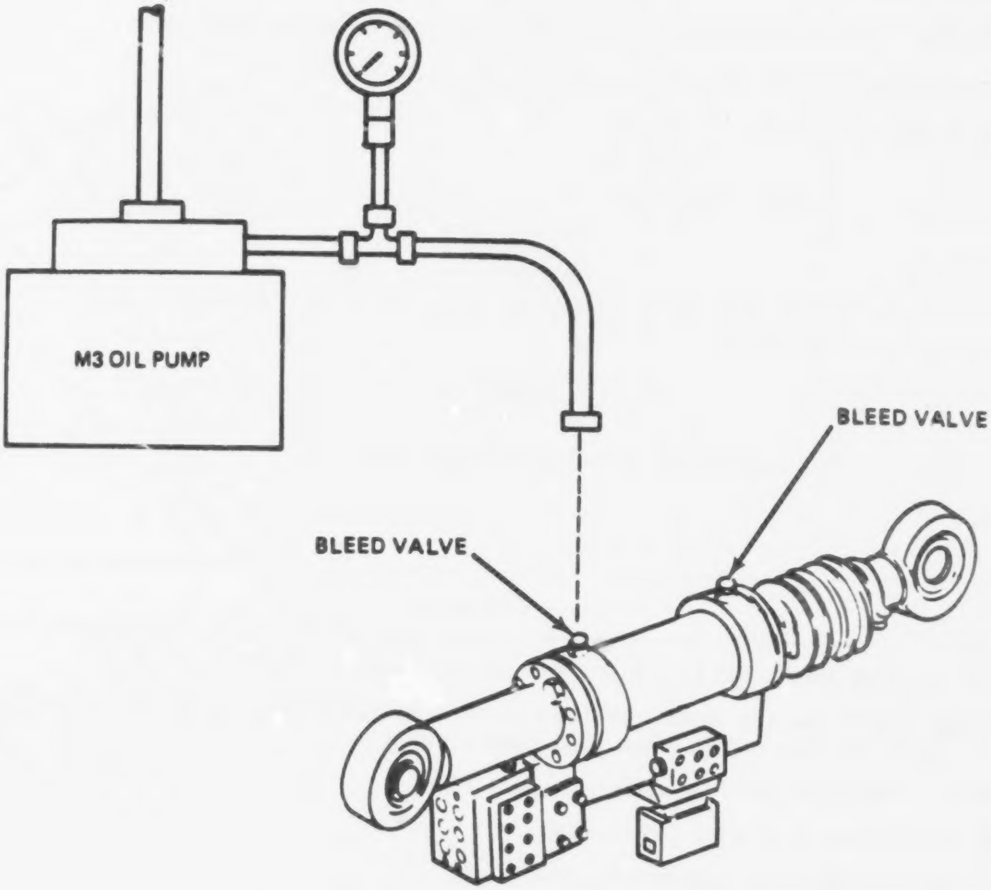
Step	Procedure
1.	Plug all ports. Close bleed valves at ports A and B.
2.	Using 3/4'' wrench, remove bleed valve from port B.
3.	Assemble M3 oil pump with pressure gauge.
4.	Connect M3 oil pump to port B.
5.	Using M3 oil pump, pump oil in elevating mechanism until pressure gauge indicates about 50 psi (JPG).
6.	Using M3 oil pump, reduce pressure to 0 psi (JPG).
7.	Disconnect M3 oil pump from port B.
8.	Using 3/4'' wrench, put bleed valve in port B.
9.	Using 3/4'' wrench, remove bleed valve from port A.
10.	Connect M3 oil pump to port A.
11.	Using M3 oil pump, pump oil in elevating mechanism until pressure gauge indicates about 200 psi (JPG).
	GO TO FRAME 2


M3 OIL PUMP
PORT B
PORT A

15-2. ELEVATING MECHANISM TEST PROCEDURE (CONT)

FRAME 2

Step	Procedure
1.	Using 3/8" wrench, open bleed valve at port B until oil flows without air and then close bleed valve at port B.
2.	Using rags, wipe all oil from outside of elevating mechanism.
3.	Using M3 oil pump, pressurize elevating mechanism until pressure gauge indicates between 2500 and 2550 psi (JPG).
	NOTE No oil should leak out of elevating mechanism.
4.	Using watch, check elevating mechanism for leaks for three minutes.
5.	Using M3 oil pump, reduce pressure in elevating mechanism to 0 psi (JPG).
6.	Disconnect M3 oil pump from port A.
7.	Using 3/4" wrench, put bleed valve in port A.
8.	Disassemble M3 oil pump and pressure gauge.
	NOTE If normal indication was obtained in frames 1 and 2, elevating mechanism is good.
	END OF TASK


M3 OIL PUMP
BLEED VALVE
BLEED VALVE

15-3. ELEVATING CYLINDER REMOVAL AND ELEVATING MECHANISM DISASSEMBLY PROCEDURE

TOOLS: 3/8" combination wrench
Vise with brass caps

SUPPLIES: Small container (two)
Rags (item 21, App. A)

PERSONNEL: One

REFERENCES: TM 9-2350-257-20-2-3 for procedure to remove elevating mechanism

EQUIPMENT CONDITION: Elevating mechanism removed (TM-20-2-3)

GENERAL INSTRUCTIONS:

CAUTION

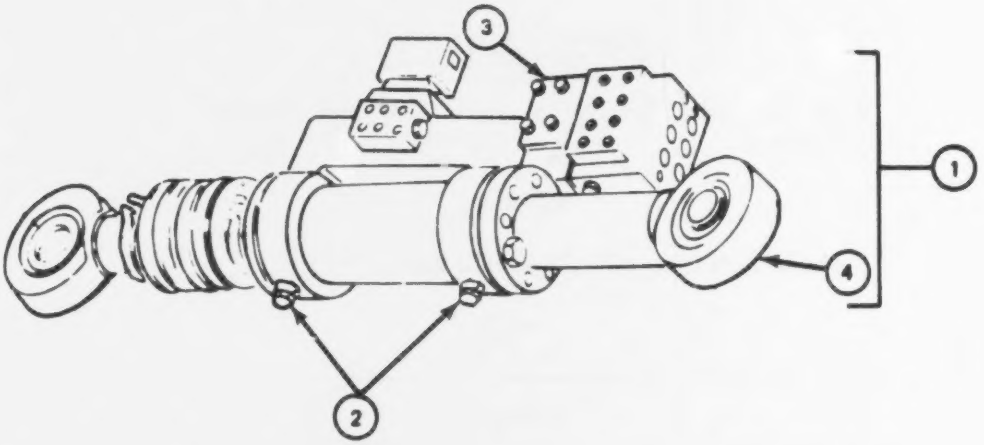
Keep dirt from getting in parts. Dirt can damage equipment.

NOTE

Use rags to clean up spilled hydraulic fluid.

FRAME 1

Step	Procedure
1.	Put elevating mechanism (1) in vise with drain cocks (2) down.
2.	Using wrench and two small containers to catch hydraulic fluid, open two drain cocks (2). Close two drain cocks when fluid stops draining.
3.	Remove elevation stabilizer valve (3) (para 15-9).
4.	Remove elevating cylinder (4) from vise.
5.	Disassemble elevating cylinder (4) (para 15-6).
6.	Disassemble elevation stabilizer valve (3) (para 15-11).
	END OF TASK



15-4. ELEVATING CYLINDER INSTALLATION AND ELEVATING MECHANISM ASSEMBLY PROCEDURE

SUPPLIES: Rags (item 21, App. A)

PERSONNEL: One

GENERAL INSTRUCTIONS:

CAUTION

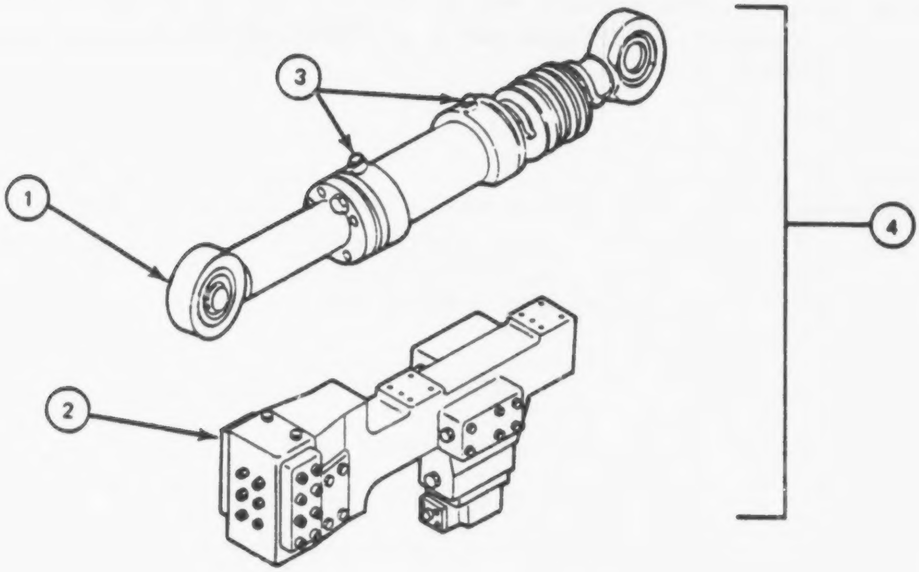
Keep dirt from getting in parts. Dirt can damage equipment.

NOTE

Use rags to clean up spilled hydraulic fluid.

FRAME 1

Step	Procedure
1.	Assemble elevating cylinder (1) (para 15-7).
2.	Assemble elevation stabilizer valve (2) (para 15-12).
3.	Put elevating cylinder (1) in vise with drain cocks (3) down.
4.	Install elevation stabilizer valve (2) (para 15-10).
5.	Remove elevating mechanism (4) from vise.
	END OF TASK



15-5. ELEVATING CYLINDER INSPECTION PROCEDURE

PERSONNEL: One

PRELIMINARY PROCEDURES: Disassemble elevating cylinder (para 15-6)

GENERAL INSTRUCTIONS:

NOTE

If part is bad, order repair part or next higher assembly as required.

15-5. ELEVATING CYLINDER INSPECTION PROCEDURE (CONT)

FRAME 1

Step | **Procedure**

SUPPORT SHOP WORK

1. Take two guides, cylinder, and piston to shop where inspection equipment is available.
2. Make dimensional checks:

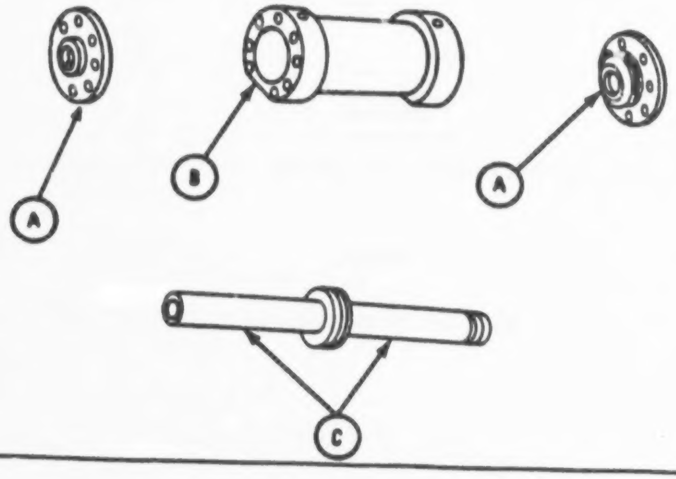
Reference Letter	Point of Measurement	Measurement
A	ID of piston guides	1.2500 to 1.2505 inches
B	ID of cylinder bore	2.7500 to 2.7510 inches
C	OD of piston, both ends	1.2480 to 1.2485 inches

NOTE

Tag parts that are out of tolerance.

3. After support shop work, return parts to turret shop.

END OF TASK



15-6. ELEVATING CYLINDER DISASSEMBLY PROCEDURE

TOOLS: Vise with brass caps
Machinist scriber
6" machinist steel rule
3/4" combination wrench
1/4" flat tip screwdriver
5/16" open end wrench
3/16" socket head screw key (Allen wrench)
1-1/8" open end wrench
Adjustable face type spanner wrench, 1/4" pins, 3/4" spacing
O-ring extractor tool
Soft faced hammer
3/4" socket (1/2" drive)
1/2" drive ratchet
20 ounce ball peen hammer
1/4" brass drift pin
Scraper

SUPPLIES: Small container (two)
Rags (item 21, App. A)

PERSONNEL: One

REFERENCES: JPG for procedures to:
Clean parts
Inspect and repair parts
Remove preformed packings
TM 9-2350-257-20-2-3 for procedure to remove elevating mechanism

EQUIPMENT CONDITION: Elevating mechanism removed (TM-20-2-3)

PRELIMINARY PROCEDURES: Test elevating mechanism (para 15-2)
Remove elevation stabilizer valve (para 15-9)

GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in parts. Dirt can damage equipment.

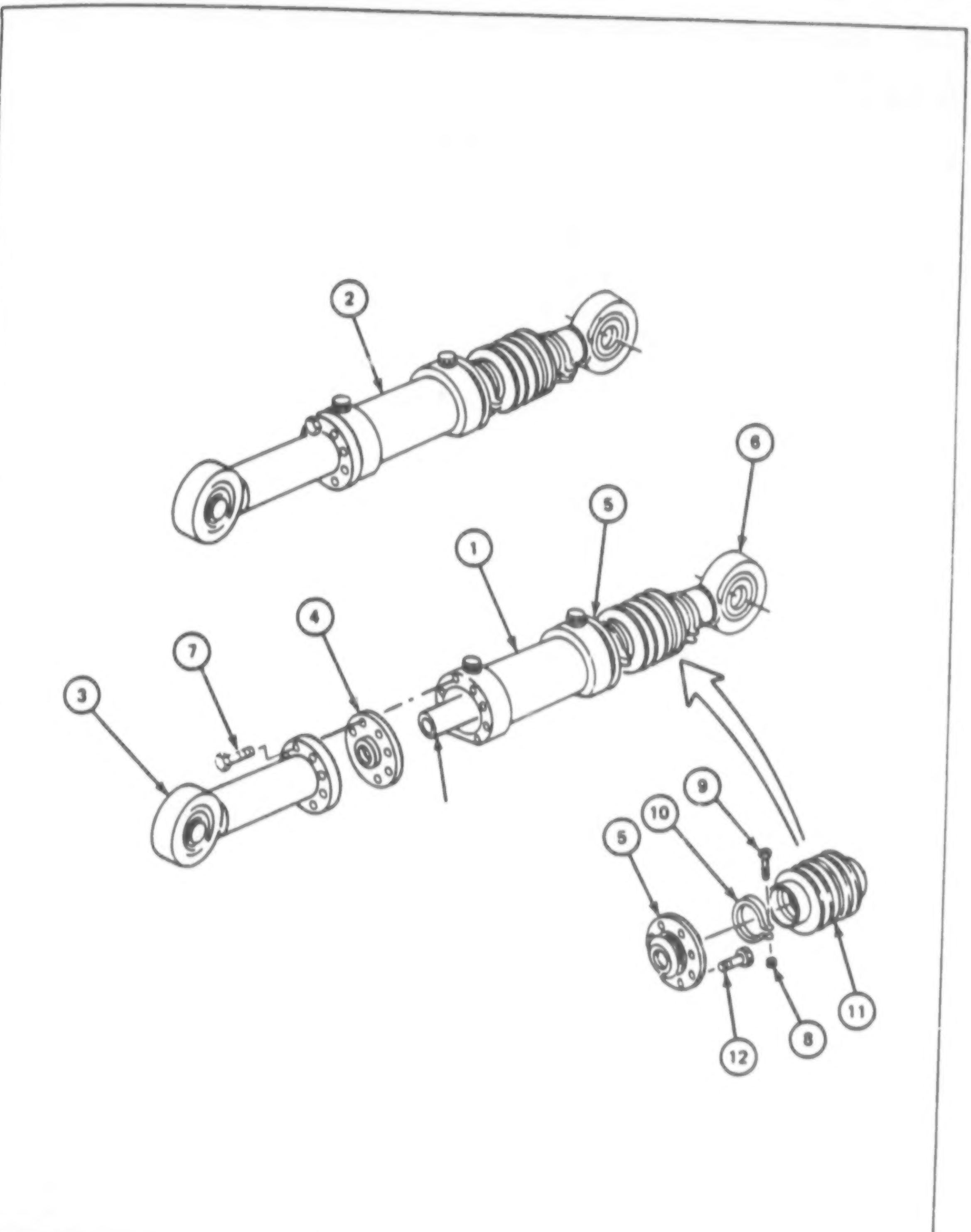
NOTE

Use rags to clean up spilled hydraulic fluid.

15-6. ELEVATING CYLINDER DISASSEMBLY PROCEDURE (CONT)

FRAME 1

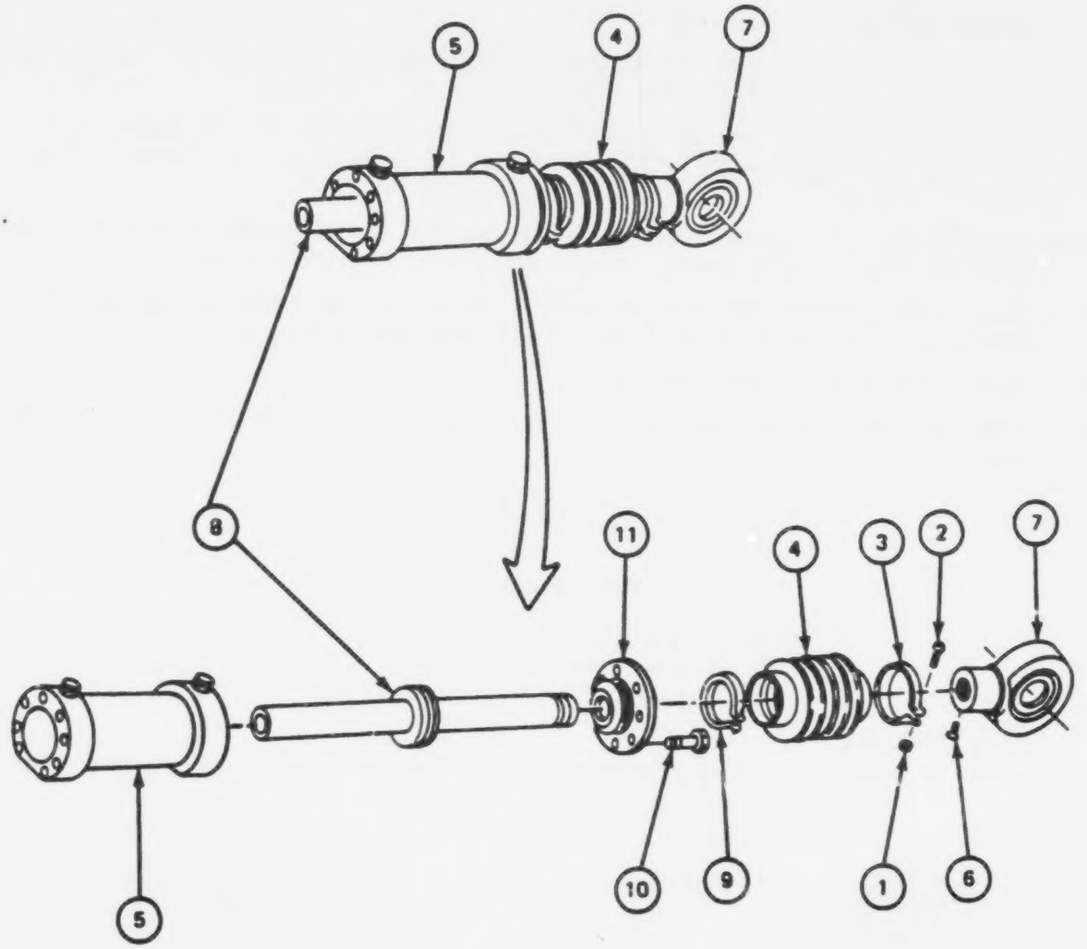
Step	Procedure
	NOTE Lines are scribed on elevation mechanism assembly before disassembly so ports can be lined up during assembly.
1.	Put cylinder (1) of elevating cylinder (2) in vise.
2.	Using scriber and steel rule, scribe line across sleeve assembly (3), guide (4) and cylind (1).
3.	Using scriber and steel rule, scribe line across cylinder (1) and guide (5) of eye assemb (6).
4.	Using socket wrench, loosen eight bolts (7) holding sleeve assembly (3) and guide (4) t cylinder (1). Do not remove eight bolts.
5.	Using screwdriver and 5/16" wrench, loosen nut (8) and screw (9) from clamp (10).
6.	Using fingers, push bellows (11) toward eye assembly (6) until eight bolts (12) can be reached.
7.	Using 3/4" combination wrench, loosen eight bolts (12) holding guide (5) to cylinder (1).
8.	Using socket wrench, remove eight bolts (7) holding sleeve assembly (3) and guide (4) to cylinder (1). Throw bolts away.
	NOTE It may be necessary to tap guide (4) with soft faced hammer to loosen.
9.	Remove sleeve assembly (3) and guide (4) from cylinder (1).
	GO TO FRAME 2



15-6. ELEVATING CYLINDER DISASSEMBLY PROCEDURE (CONT)

FRAME 2

Step	Procedure
1.	Using screwdriver and 5/16" wrench, loosen nut (1) and screw (2) on clamp (3).
2.	Using fingers, push bellows (4) toward cylinder (5) until setscrew (6) can be reached.
3.	Using Allen wrench, loosen setscrew (6) from eye assembly (7).
4.	Using 1-1/8" wrench on eye assembly (7) and spanner, wrench on end of piston (8), unscrew eye assembly from piston.
5.	Remove eye assembly (7), two clamps (3) and (9), and bellows (4) from piston (8).
6.	Using 3/4" combination wrench, remove eight bolts (10) holding guide (11) to cylinder (5). Throw bolts away.
7.	Remove guide (11) from piston (8) and cylinder (5).
8.	Remove piston (8) from cylinder (5).
	GO TO FRAME 3


5
4
7
8
11
4
3
2
7
5
10
9
1
6

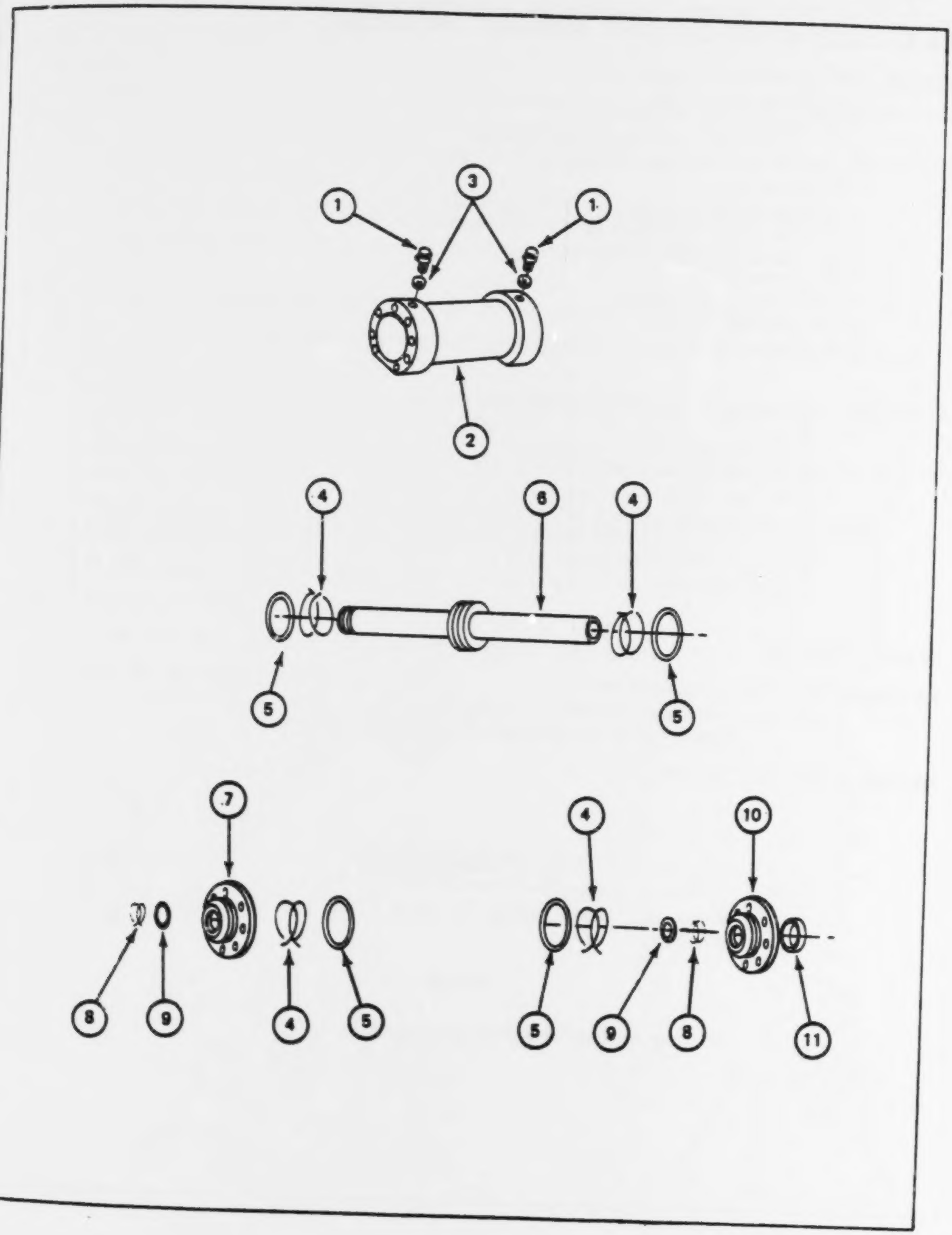
Para 15-6 Cont

best copy available

15-6. ELEVATING CYLINDER DISASSEMBLY PROCEDURE (CONT)

FRAME 3

Step	Procedure
1.	Using 3/4" combination wrench, remove two drain cocks (1) from cylinder (2).
2.	Remove cylinder (2) from vise.
3.	Using O-ring extractor tool, remove two preformed packings (3) from two drain cocks (1) (JPG). Throw preformed packings away.
4.	Using O-ring extractor tool, remove two packing retainers (4) and two preformed packings (5) from piston (6) (JPG). Throw packing retainers and preformed packing away.
5.	Using O-ring extractor tool, remove packing retainer (4) and preformed packing (5) from guide (7) (JPG). Throw packing retainer and preformed packing away.
6.	Using O-ring extractor tool, remove packing retainer (8) and preformed packing (9) from guide (7) (JPG). Throw packing retainer and preformed packing away.
7.	Repeat steps 4 and 5 for guide (10).
8.	Using ball peen hammer and drift pin, remove seal (11) from guide (10). Throw seal away.
	NOTE Follow-on Maintenance Action Required: Clean all parts (JPG). Inspect and repair all parts (JPG). Do detail inspection of parts (para 15-5). END OF TASK



15-7. ELEVATING CYLINDER ASSEMBLY PROCEDURE

TOOLS: 3/4" combination wrench
1/4" flat tip screwdriver
5/16" combination wrench
3/16" socket head screw key (Allen wrench)
Adjustable face type spanner wrench, 1/4" pins, 3/4" spacing
3/4" socket
1/2" drive torque wrench (0 to 50 foot-pounds)
3/8" drive torque wrench (0 to 600 inch-pounds)
3/16" hex head socket (3/8" drive)
O-ring extractor kit
20 ounce ball peen hammer
1-1/8" open end wrench
Vise with brass caps

SUPPLIES: Elevating cylinder repair kit (5910819)
Rags (item 21, App. A)
Hydraulic fluid (item 10, App. A)
Bolts (MS 35764-1068) (eight)
Bolts (MS 35764-1071) (eight)
Preformed packing (MS 28775-230) (four)
Preformed packing (MS 28775-218) (two)
Packing retainer (MS 28783-8) (four)
Packing retainer (MS 28782-23) (two)

PERSONNEL: One

REFERENCES: JPG for procedures to:
Use torque wrench
Install preformed packings, retainer rings, and seals

GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in parts. Dirt can damage equipment.

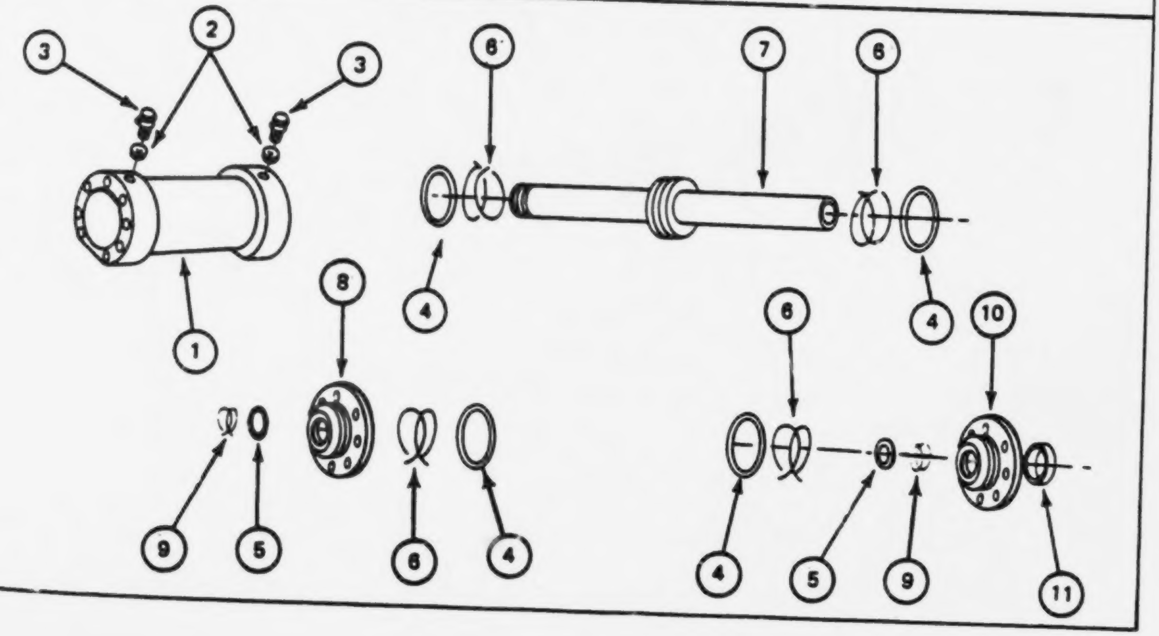
NOTE

Use rags to clean up spilled hydraulic fluid.

15-7. ELEVATING CYLINDER ASSEMBLY PROCEDURE (CONT)

FRAME 1

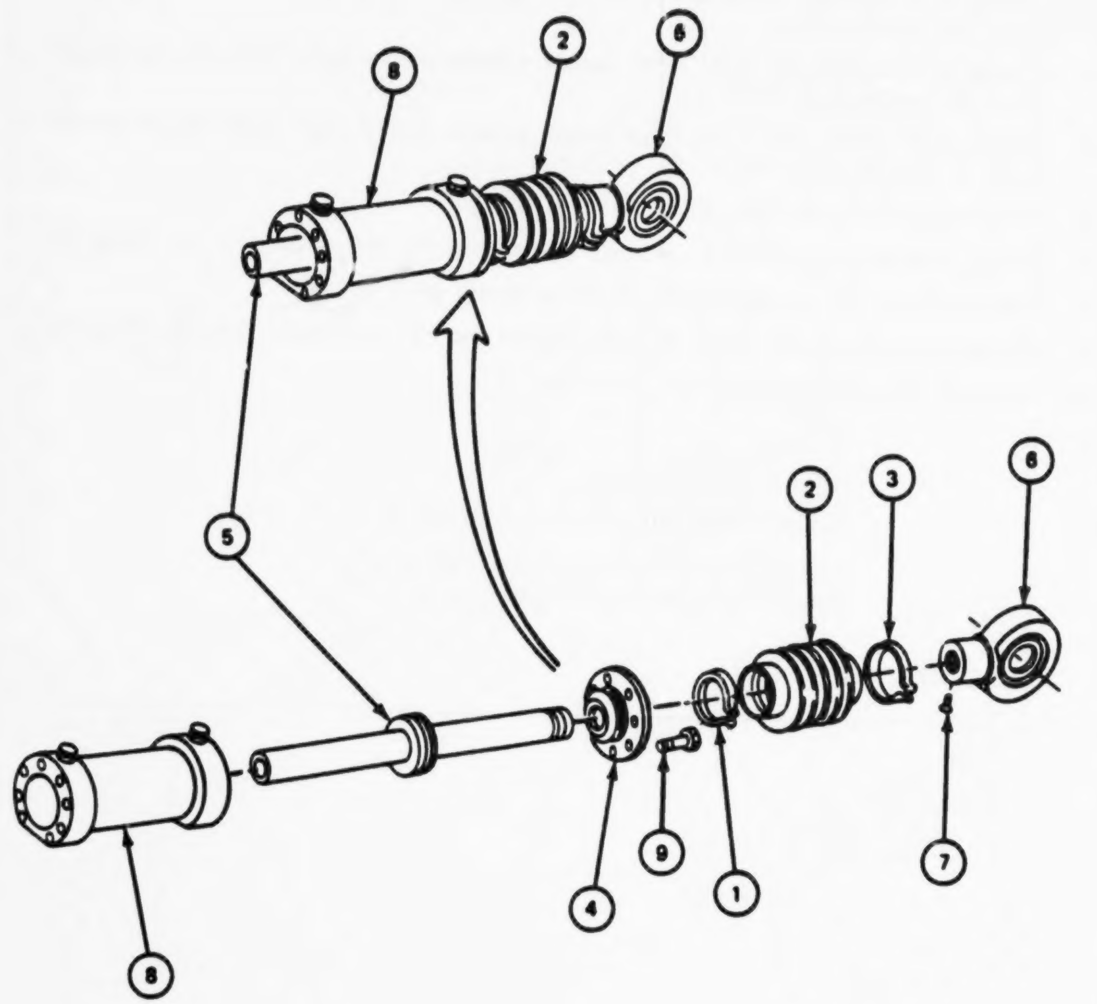
Step	Procedure
1.	Put cylinder (1) in vise.
2.	Lightly coat two preformed packings (2) (MS 28778-4) with hydraulic fluid.
3.	Using O-ring extractor tool, put two preformed packings (2) on two drain cocks (3) (JPG).
4.	Using 3/4" combination wrench, attach two drain cocks (3) to cylinder (1).
5.	Lightly coat four preformed packings (4) (MS 28775-230) and two preformed packings (5) (MS 28775-218) with hydraulic fluid.
6.	Using O-ring extractor tool, put two packing retainers (6) (MS 28783-8) and two preformed packings (4) on piston (7) (JPG).
7.	Using O-ring extractor tool, put packing retainers (6) and preformed packing (4) on guide (8) (JPG).
8.	Using O-ring extractor tool, put packing retainer (9) (MS 28782-23) and preformed packing (5) on guide (8) (JPG).
9.	Repeat steps 7 and 8 for guide (10).
10.	Lightly coat seal (11) with hydraulic fluid.
11.	Using ball peen hammer, put seal (11) in guide (10) (JPG).
	GO TO FRAME 2



15-7. ELEVATING CYLINDER ASSEMBLY PROCEDURE (CONT)

FRAME 2

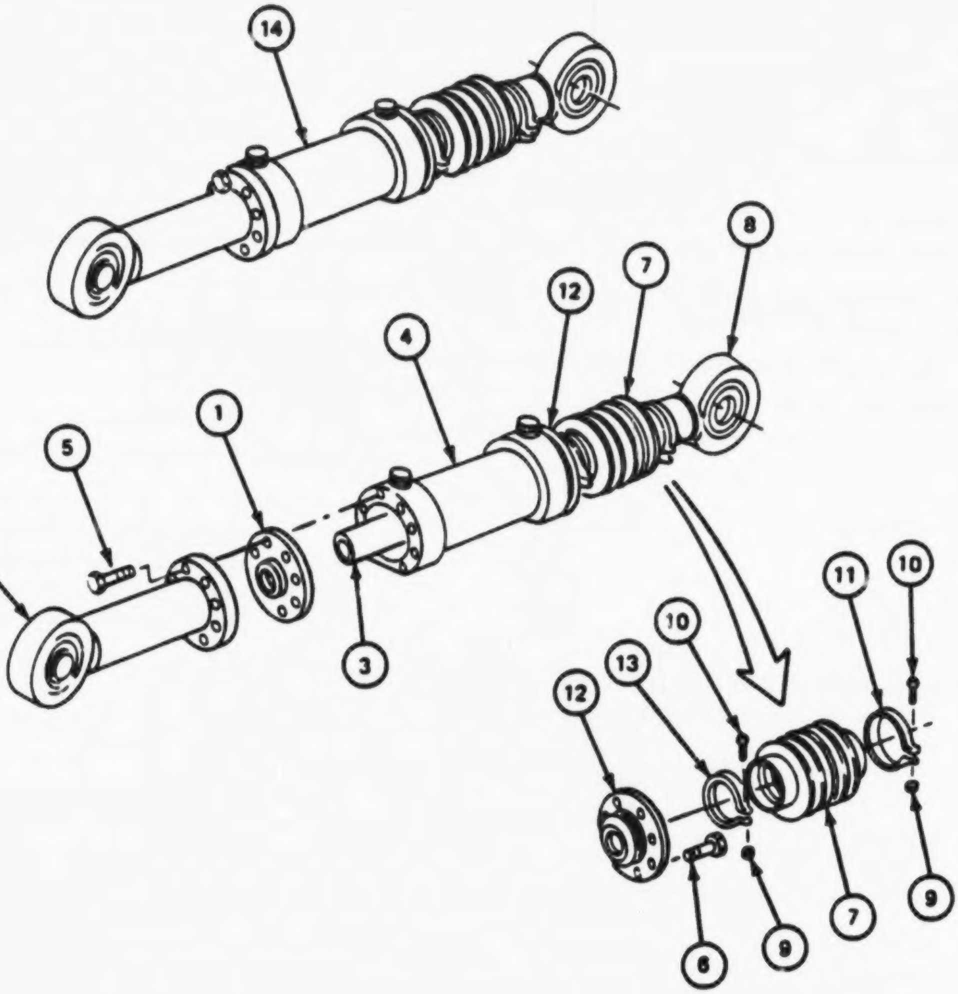
Step	Procedure
1.	Put clamp (1) on bellows (2). Do not tighten clamp.
2.	Put clamp (3) on bellows (2). Do not tighten clamp.
3.	Slide larger hole of bellows (2) on guide (4).
4.	Slide guide (4) and bellows (2) on piston (5).
5.	Using 1-1/8" wrench and spanner wrench, screw eye (6) on piston (5) until setscrew hole in eye is lined up with setscrew hole in piston.
6.	Using Allen wrench, put setscrew (7) in eye (6).
7.	Using hex head socket and 3/8" drive torque wrench, torque setscrew (7) to between 180 and 200 inch-pounds (JPG).
8.	Slide piston (5), guide (4) and eye (6) in cylinder (8).
9.	Line up scribed lines on guide (4) and cylinder (8).
10.	Using 3/4" combination wrench, attach guide (4) to cylinder (8) with eight new bolts (9) (MS 35764-1068).
	GO TO FRAME 3



15-7. ELEVATING CYLINDER ASSEMBLY PROCEDURE (CONT)

FRAME 3

Step	Procedure
1.	Put guide (1) and sleeve (2) on piston (3).
2.	Line up two scribed lines on sleeve (2), guide (1), and cylinder (4).
3.	Using 3/4" wrench, attach sleeve (2) and guide (1) to cylinder (4) with eight new bolts (5) (MS 35764-1071).
4.	Using 3/4" socket and 1/2" drive torque wrench, torque eight bolts (5) to between 90 and 95 foot-pounds (JPG).
5.	Using 3/4" socket and 1/2" drive torque wrench, torque eight bolts (6) to between 90 and 95 foot-pounds (JPG).
6.	Slide bellows (7) on eye (8) as far as it will go.
7.	Using screwdriver and 5/16" wrench, tighten nut (9) and screw (10) on clamp (11).
8.	Slide bellows (7) on guide (12) as far as it will go.
9.	Using screwdriver and 5/16" wrench, tighten nut (9) and screw (10) on clamp (13).
10.	Remove elevating cylinder (14) from vise.
	NOTE Follow-on Maintenance Action Required: Install elevation stabilizer valve (para 15-10). Test elevating mechanism (para 15-2).
	END OF TASK



15-8. ELEVATING CYLINDER REPAIR PROCEDURE

SUPPLIES: Bearing (two) 8376373

PERSONNEL: One

PRELIMINARY PROCEDURES: Disassemble elevating cylinder (para 15-6)

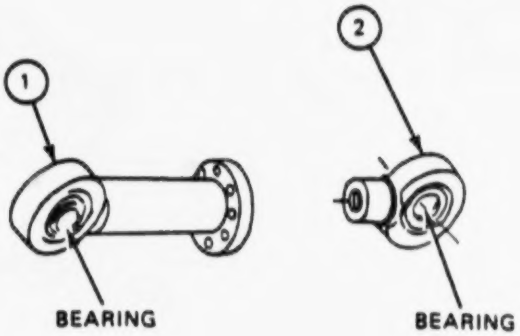
GENERAL INSTRUCTIONS:

NOTE

Procedure is used to replace bad bearings in sleeve or eye assembly.

FRAME 1

Step	Procedure
1.	Take sleeve (1), eye assembly (2) and new bearings to shop where press is available. a. Remove bad bearings. b. Install new bearings.
2.	After support shop work, return sleeve (1) and eye assembly (2) to turret shop. END OF TASK



15-9. ELEVATION STABILIZER VALVE REMOVAL PROCEDURE

TOOLS: 9/16" open end wrench
11/16" open end wrench
1/4" socket head screw key (Allen wrench)
1" open end wrench
1-1/8" open end wrench
O-ring extractor kit

SUPPLIES: Plugs for hydraulic tubes and manifold ports (twelve)
Plugs for elevation mechanism and manifold ports (twelve)
Small container
Rags (item 21, App. A)
Masking tape (1" wide) (item 36, App. A)
Pen

PERSONNEL: Two (vehicle with stab)
One (vehicle without stab)

REFERENCES: TM 9-2350-257-20-2-3 for procedure to lower hydraulic pressure
JPG for procedures to:
Disconnect electrical connectors
Remove preformed packings
Tag hydraulic tubes

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Elevating Mechanism	FO-3	9
Gunner's Control Box	FO-1	2
Driver's Master Control Panel	FO-4	10
Turret Traverse Lock	FO-4	6

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
Gunner's control box ELEV/TRAV POWER switch set to OFF
Turret traverse lock set to LOCKED
105-mm gun depressed and tied down to front lifting eye

GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in tubing or parts. Dirt can damage equipment.

NOTE

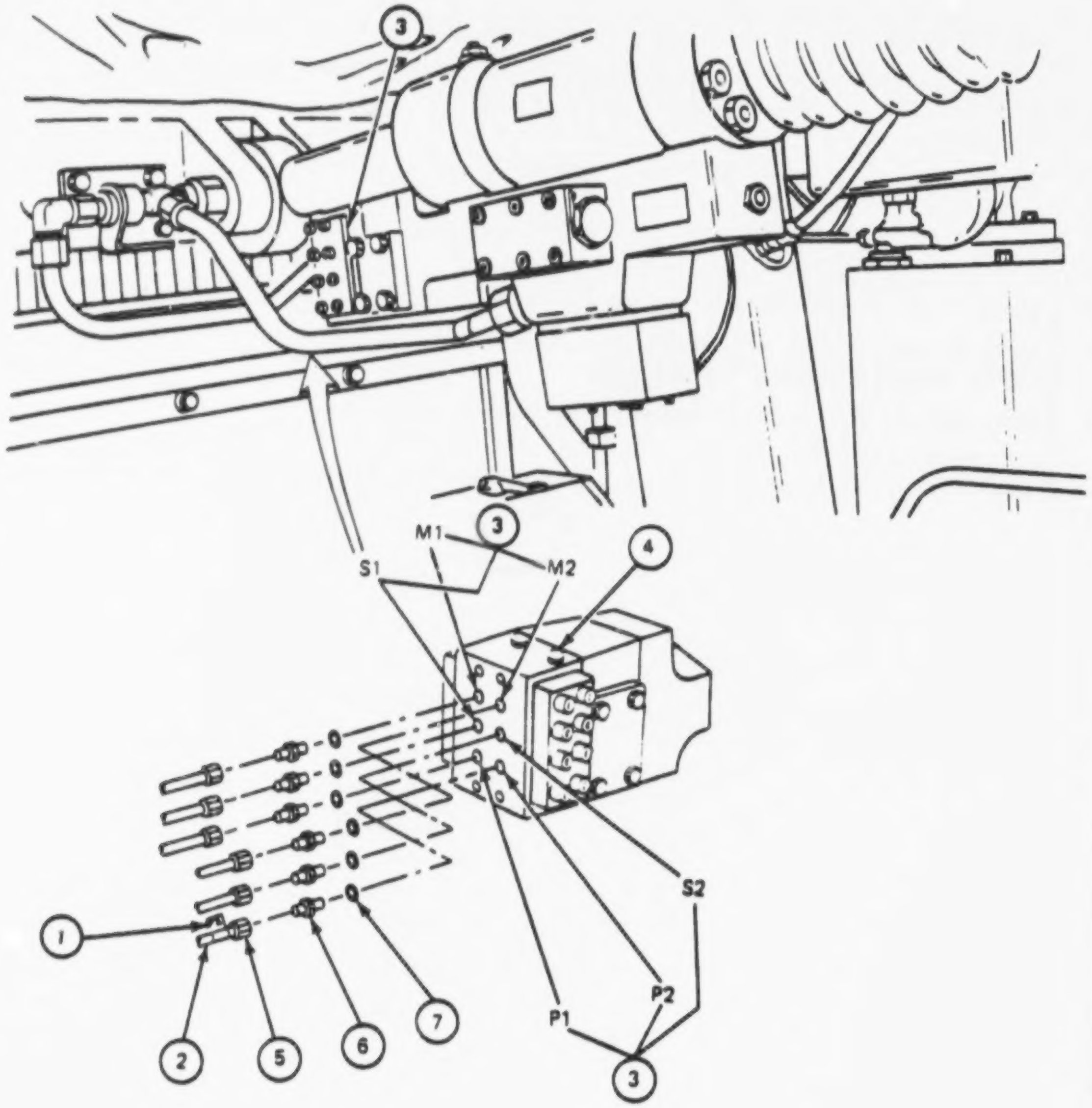
Use small container to catch hydraulic fluid which leaks when hydraulic lines are disconnected. Use rags to wipe up spilled hydraulic fluid.

Equipment condition applies only if task is being done on vehicle.

15-9. ELEVATION STABILIZER VALVE REMOVAL PROCEDURE (CONT)

FRAME 1

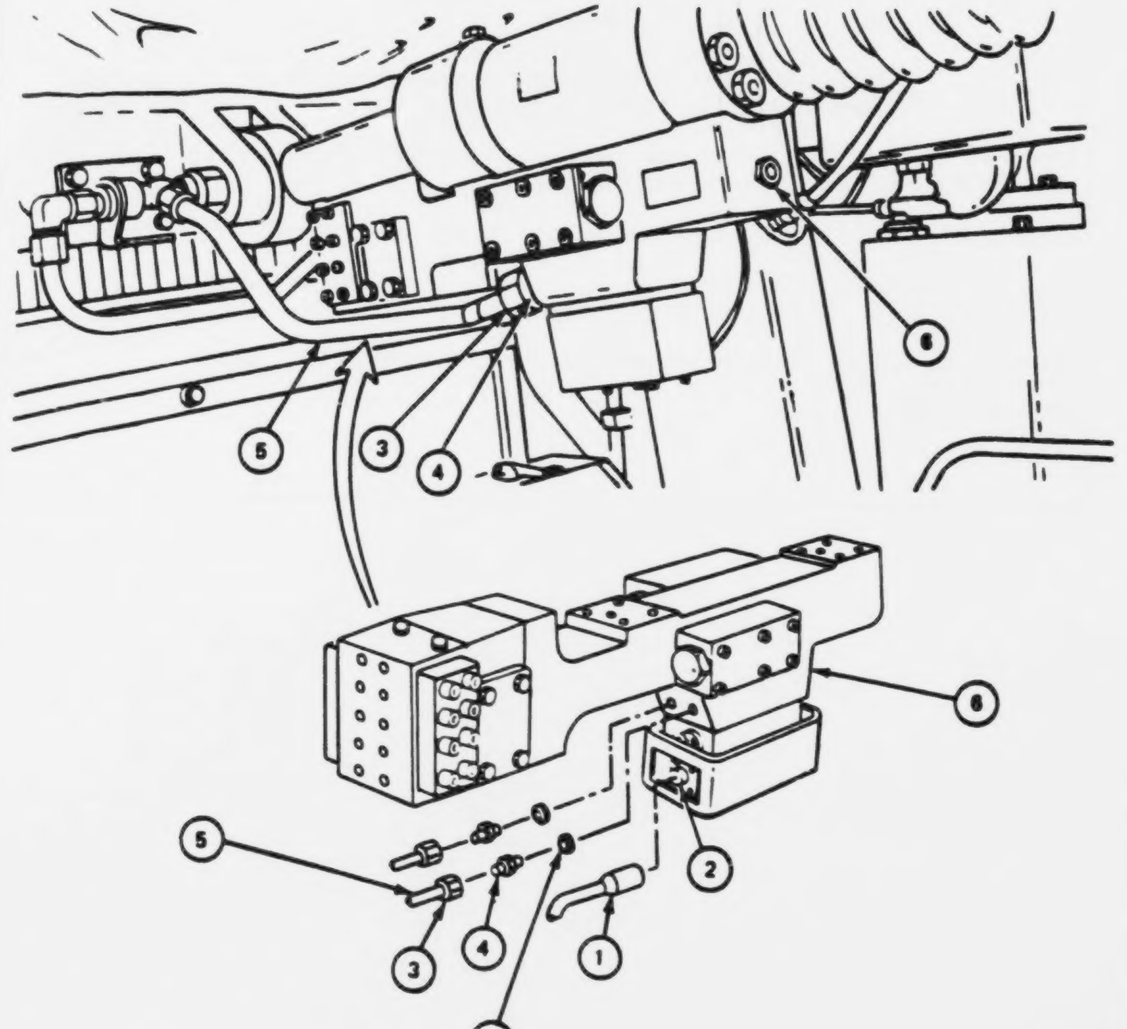
Step	Procedure
	WARNING Before removing hydraulic tubes or parts, hydraulic system pressure must be lowered to 0 psi. Hydraulic fluid under pressure can hurt you.
1.	Lower hydraulic pressure to 0 psi (TM-20-2-3).
2.	Using masking tape (1), tag each of six hydraulic tubes (2) with port identification markings (3) on lock valve (4) (JPG).
	WARNING Ports M1 and M2 in elevation lock valve (4) may have hydraulic oil under pressure from manual accumulator. Loosen hydraulic tube until oil under pressure comes out before disconnecting hydraulic tubes.
3.	Using 9/16" wrench on tube assenbly nut (5) and 11/16" wrench on nipple (6), remove six tube assemblies (2) from six nipples (6).
4.	Separate six tube assemblies (2) from six nipples (6).
	NOTE Do steps 5 and 6 only if elevation stabilizer valve is replaced.
5.	Using 11/16" wrench, remove six nipples (6) from lock valve (4).
6.	Using O-ring extractor tool, remove six preformed packings (7) from six nipples (6) (JPG). Throw preformed packings away.
7.	Plug tube assembly nuts (5) and lock valve (4) ports twelve places. GO TO FRAME 2


M1
M2
S1
S2
P2
P1

15-9. ELEVATION STABILIZER VALVE REMOVAL PROCEDURE (CONT)

FRAME 2

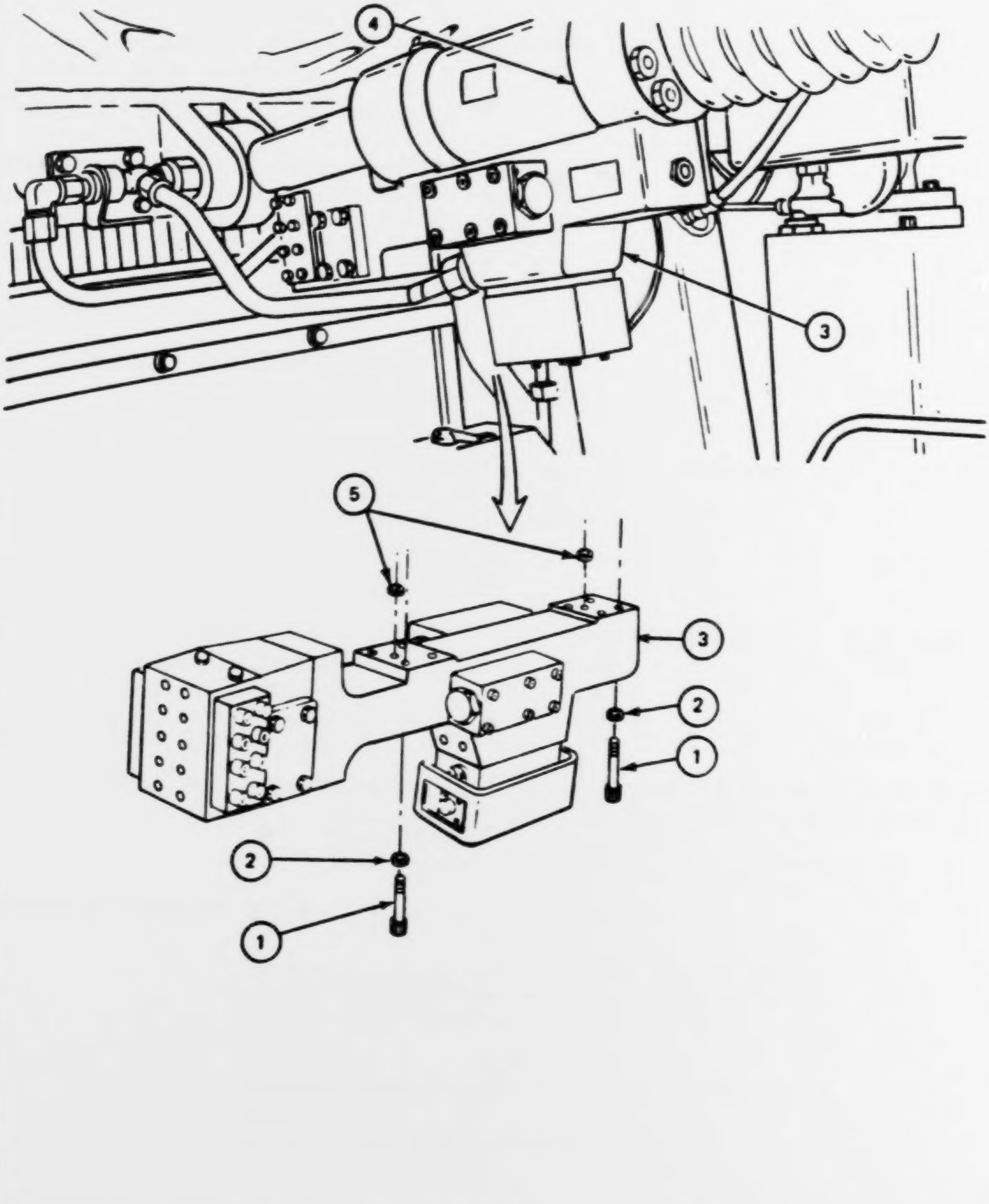
Step	Procedure
1.	Disconnect electrical connector (1) from elevation servovalve (2) (JPG).
2.	Using 1" wrench on tube assembly nuts (3), and 1-1/8" wrench on nipples (4), disconnect two tube assembly nuts from two nipples (4).
	NOTE Do step 4 and 5 only if elevation stabilizer valve (6) is replaced.
4.	Using 1-1/8" wrench, remove two nipples (4) from elevation stabilizer valve (6).
5.	Using O-ring extractor tool, remove two preformed packings (7) from two nipples (4) (JPG). Throw preformed packings away.
6.	Plug tube assembly nuts (3) and elevation stabilizer valve (6), four places. GO TO FRAME 3



15-9. ELEVATION STABILIZER VALVE REMOVAL PROCEDURE (CONT)

FRAME 3

Step	Procedure
	NOTE Soldier A: Hold elevation stabilizer valve (3) in place. Soldier B: Remove screws (1).
1.	Using 1/4" Allen wrench, remove eight screws (1) and eight lockwashers (2) holding elevation stabilizer valve (3) to elevating cylinder (4).
2.	Separate and remove elevation stabilizer valve (3) from elevating cylinder (4).
3.	Using O-ring extractor tool, remove two preformed packings (5) from elevating cylinder (4) (JPG). Throw preformed packings away.
4.	Plug elevating cylinder (4) ports and elevation stabilizer valve (3) four places.
	END OF TASK



15-10. ELEVATION STABILIZER VALVE INSTALLATION PROCEDURE

TOOLS:
1/4" socket head screw key (Allen wrench)
1" open end wrench
1-1/8" open end wrench
1/4" hex head socket (3/8" drive)
11/16" open end wrench
3/8" drive torque wrench (0-150 inch-pounds)
O-ring extractor kit
9/16" open end wrench
7/32" hex head socket (3/8" drive)

SUPPLIES:
Preformed packings, 546925 (two)
Preformed packings, MS 28778-4 (two)
Hydraulic fluid (item 10, App. A)
Rags (item 21, App. A)

PERSONNEL: Two

REFERENCES:
JPG for procedures to:
  Connect electrical connectors
  Use torque wrench
  Install preformed packings
TM 9-2350-257-10 for procedure to elevate gun and traverse turret
TM 9-2350-257-20-2-3 for procedures to:
  Service turret hydraulic system filter
  Bleed turret hydraulic system

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Elevating Mechanism	FO-3	9
Gunner's Control Box	FO-1	2
Driver's Master Control Panel	FO-4	10
Turret Traverse Lock	FO-4	6

EQUIPMENT CONDITION:
Driver's master control panel MASTER BATTERY switch set to OFF
Gunner's control box ELEV/TRAV POWER switch set to OFF
Turret traverse lock set to LOCKED
105-mm gun depressed and tied down to front lifting eye

GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in tubing or parts. Dirt can damage equipment. Hydraulic lines must be connected to port as marked on tags to keep from damaging equipment.

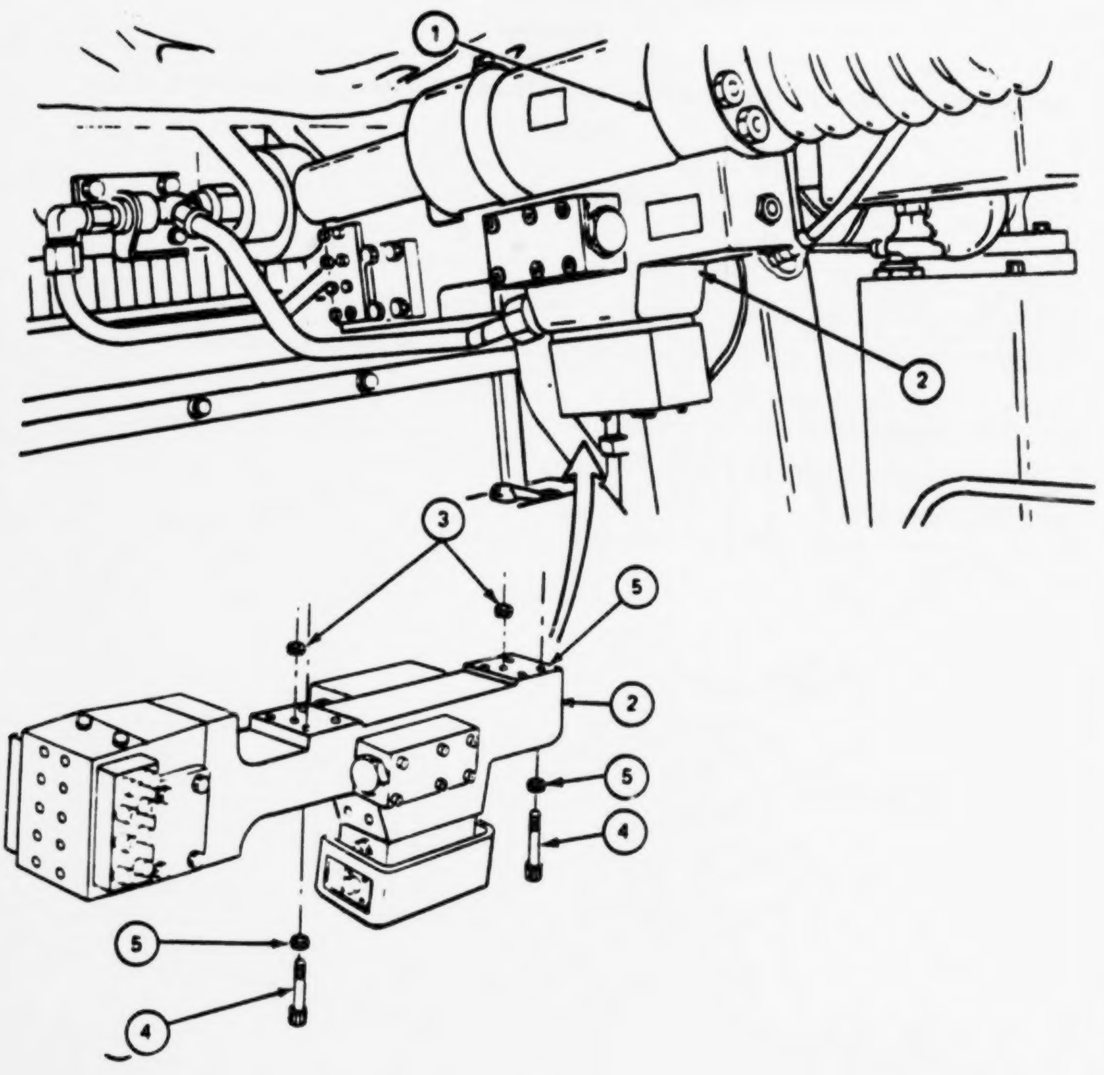
NOTE

Equipment condition applies only if task is being done on vehicle.
Use rags to wipe up spilled hydraulic fluid.

15-10. ELEVATION STABILIZER VALVE INSTALLATION PROCEDURE (CONT)

FRAME 1

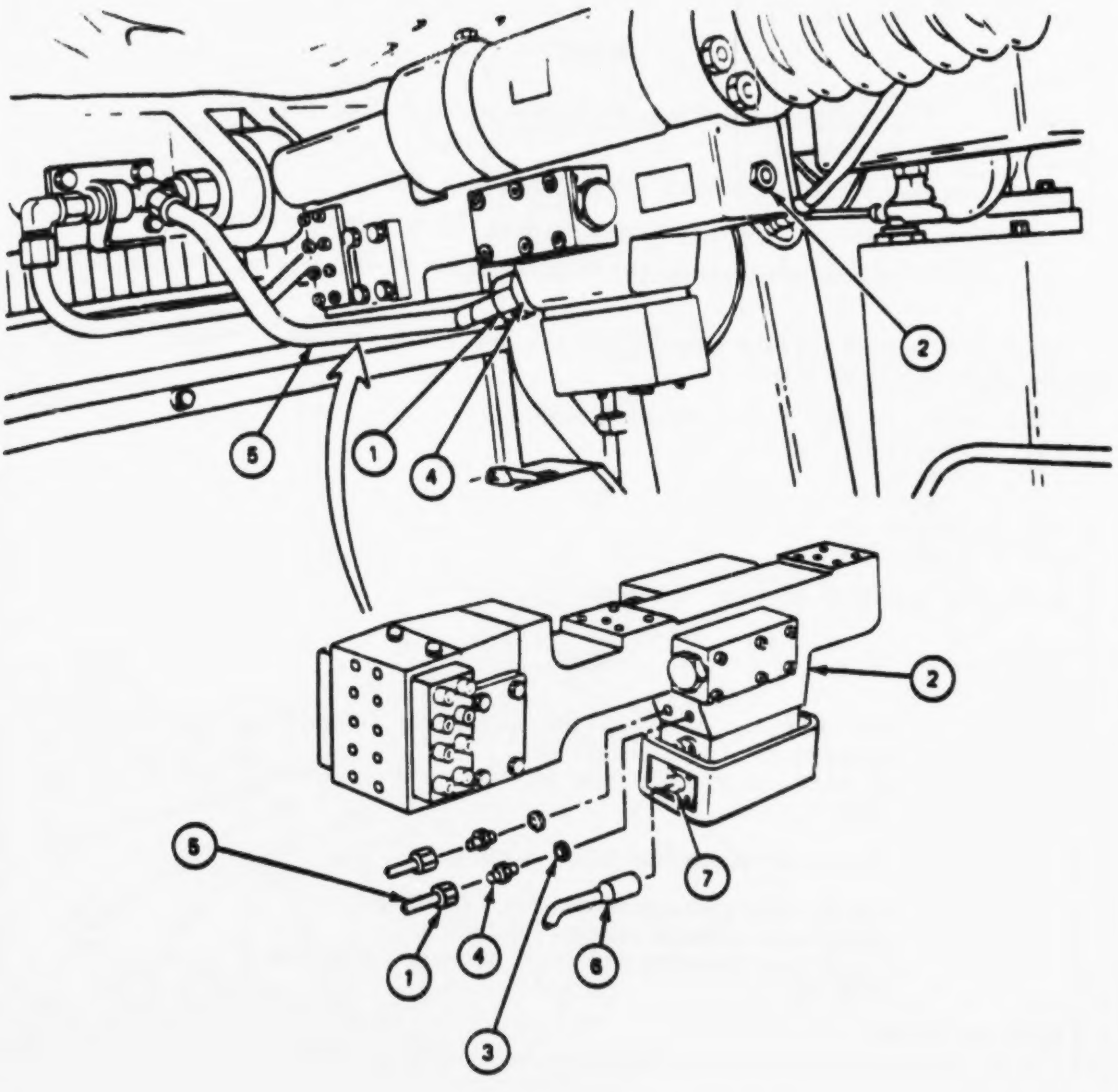
Step	Procedure
1.	Remove two plugs from elevating cylinder (1) and two plugs from elevation stabilizer valve (2).
2.	Lightly coat two new preformed packings (546925) (3) with hydraulic fluid.
3.	Put two preformed packings (3) in elevating cylinder (1) ports (JPG). **NOTE** Soldier A: Hold elevation stabilizer valve (2) in place. Soldier B: Put in screw (4). **NOTE** Use four longer screws (4) to attach back of elevation stabilizer valve (2).
4.	Using 1/4" Allen wrench, attach elevating stabilizer valve (2) to elevating cylinder (1) with eight screws (4) and eight lockwashers (5).
5.	Using hex head socket with torque wrench, torque eight screws (4) to between 60 and 65 inch-pounds. GO TO FRAME 2



15-10. ELEVATION STABILIZER VALVE INSTALLATION PROCEDURE (CONT)

FRAME 2

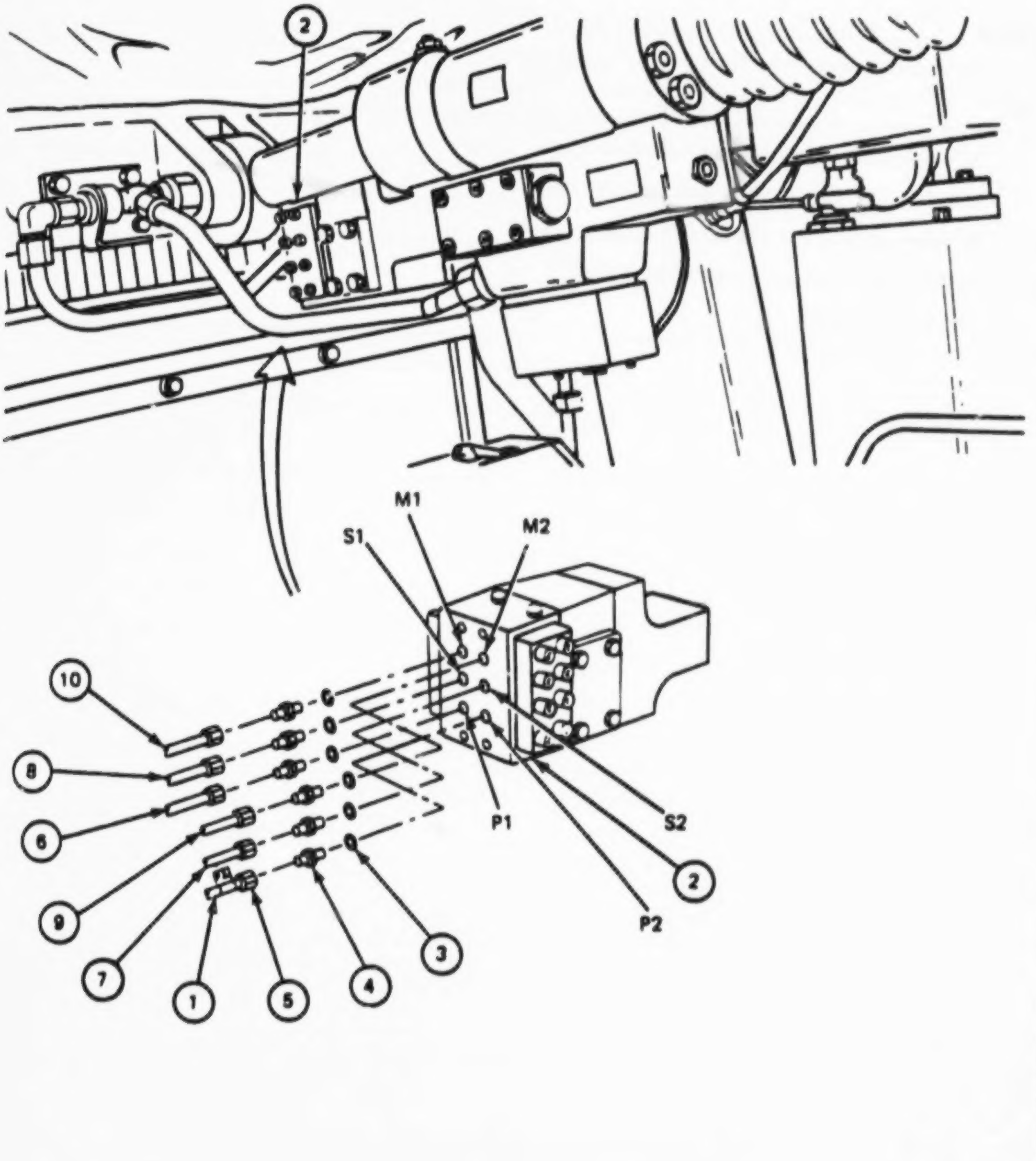
Step	Procedure
1.	Remove plugs from two tube assembly nuts (1) and elevation stabilizer valve (2). **NOTE** Do steps 2 thru 4 if elevation stabilizer valve (2) was replaced.
2.	Lightly coat two new preformed packings (3) with hydraulic fluid.
3.	Using O-ring extractor tool, put two preformed packings (3) on two nipples (4) (JPG).
4.	Using 1-1/8" wrench, attach two nipples (4) to elevation stabilizer valve (2).
5.	Using 1" wrench on tube assembly nut (1), and 1-1/8" wrench on nipple (4), connect two tube assemblies (9) to two nipples (4).
6.	Connect electrical connector (6) to servovalve (7) (JPG).
	GO TO FRAME 3



15-10. ELEVATION STABILIZER VALVE INSTALLATION PROCEDURE (CONT)

FRAME 3

Step	Procedure
1.	Remove plugs from tube assembly (1) tagged P2 and from port hole marked P2 in elevation stabilizer valve (2). **NOTE** Do steps 2 thru 4 only if elevation stabilizer valve (2) was replaced.
2.	Lightly coat new preformed packing (3) with hydraulic fluid.
3.	Using O-ring extractor tool, put preformed packing (3) on nipple (4) (JPG).
4.	Using 11/16" wrench, attach nipple (4) to port marked P2 on elevation stabilizer valve (2).
5.	Using 9/16" wrench on tube assembly nut (5), and 11/16" wrench on nipple (4), attach tube assembly (1) to nipple (4).
6.	Repeat steps 1 through 5 for tube assemblies: (6) tagged P1 (7) tagged S2 (8) tagged S1 (9) tagged M2 (10) tagged M1
7.	Remove six tags from six tube assemblies (1). **NOTE** Do following tasks if this procedure completes maintenance of hydraulic system. If other maintenance must be done, omit following tasks. Follow-on Maintenance Action Required: Service turret hydraulic system filter (TM-20-2-3). Bleed turret hydraulic system (TM-20-2-3). Check gun elevation and turret traversing operation (TM-10). END OF TASK


M1
S1
M2
P1
S2
P2

15-11. ELEVATION STABILIZER VALVE DISASSEMBLY AND MANIFOLD REMOVAL PROCEDURE

PERSONNEL: One

PRELIMINARY PROCEDURES: Remove elevation stabilizer valve (para 15-9)

FRAME 1

Step	Procedure
1.	Remove lock valve and relief valve (para 15-14).
2.	Remove left pilot check valve (para 15-21).
3.	Remove right pilot check valve (para 15-23).
4.	Remove elevation servovalve (para 15-25).
	END OF TASK

15-12. ELEVATION STABILIZER VALVE ASSEMBLY AND MANIFOLD INSTALLATION PROCEDURE

PERSONNEL: One

FRAME 1

Step	Procedure
1.	Install lock valve and relief valve (para 15-15).
2.	Install left pilot check valve (para 15-22).
3.	Install right pilot check valve (para 15-24).
4.	Install elevation servovalve (para 15-26). **NOTE** Follow-on Maintenance Action Required: Install elevation stabilizer valve (para 15-10).
	END OF TASK

15-13. LOCK VALVE INSPECTION PROCEDURE

TOOLS: 6" machinist steel rule

PERSONNEL: One

PRELIMINARY PROCEDURES: Disassemble lock valve (para 15-16)

GENERAL INSTRUCTIONS:

NOTE

If any part is bad, order repair part or next higher assembly as required.

FRAME 1

Step	Procedure
1.	Using steel rule, measure free overall length of six large diameter springs. If any spring is less than 3/4", spring is bad.
2.	Using steel rule, measure free overall length of six small diameter springs. If any spring is less than 7/8", spring is bad.
	END OF TASK

15-14. LOCK VALVE AND RELIEF VALVE REMOVAL PROCEDURE

TOOLS:
- 1/4" hex head socket (3/8" drive)
- 9/16" open end wrench
- 11/16" open end wrench
- 3/8" drive ratchet
- 4" extension (3/8" drive)
- O-ring extractor kit

SUPPLIES:
- Masking tape (1" wide) (item 36, App. A)
- Plugs for hydraulic tubes and lock valve (twelve)
- Plugs for lock valve and relief valve (four)
- Plugs for relief valve and manifold (four)
- Small container
- Rags (item 21, App. A)
- Pencil

PERSONNEL: One

REFERENCES: TM 9-2350-257-20-2-3 for procedure to lower hydraulic pressure
JPG for procedures to:
- Remove preformed packings
- Tag hydraulic tubes

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Elevating Mechanism	FO-3	9
Gunner's Control Box	FO-1	2
Driver's Master Control Panel	FO-4	10
Turret Traverse Lock	FO-4	6

EQUIPMENT CONDITION:
- Driver's master control panel MASTER BATTERY switch set to off
- Gunner's control box ELEV/TRAV POWER switch set to OFF
- Turret traverse lock set to LOCKED
- 105-mm gun depressed and tied down to front lifting eye

GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in tubing or parts. Dirt can damage equipment.

NOTE

Use small container to catch hydraulic fluid which leaks when hydraulic lines are disconnected. Use rags to wipe up spilled hydraulic fluid.

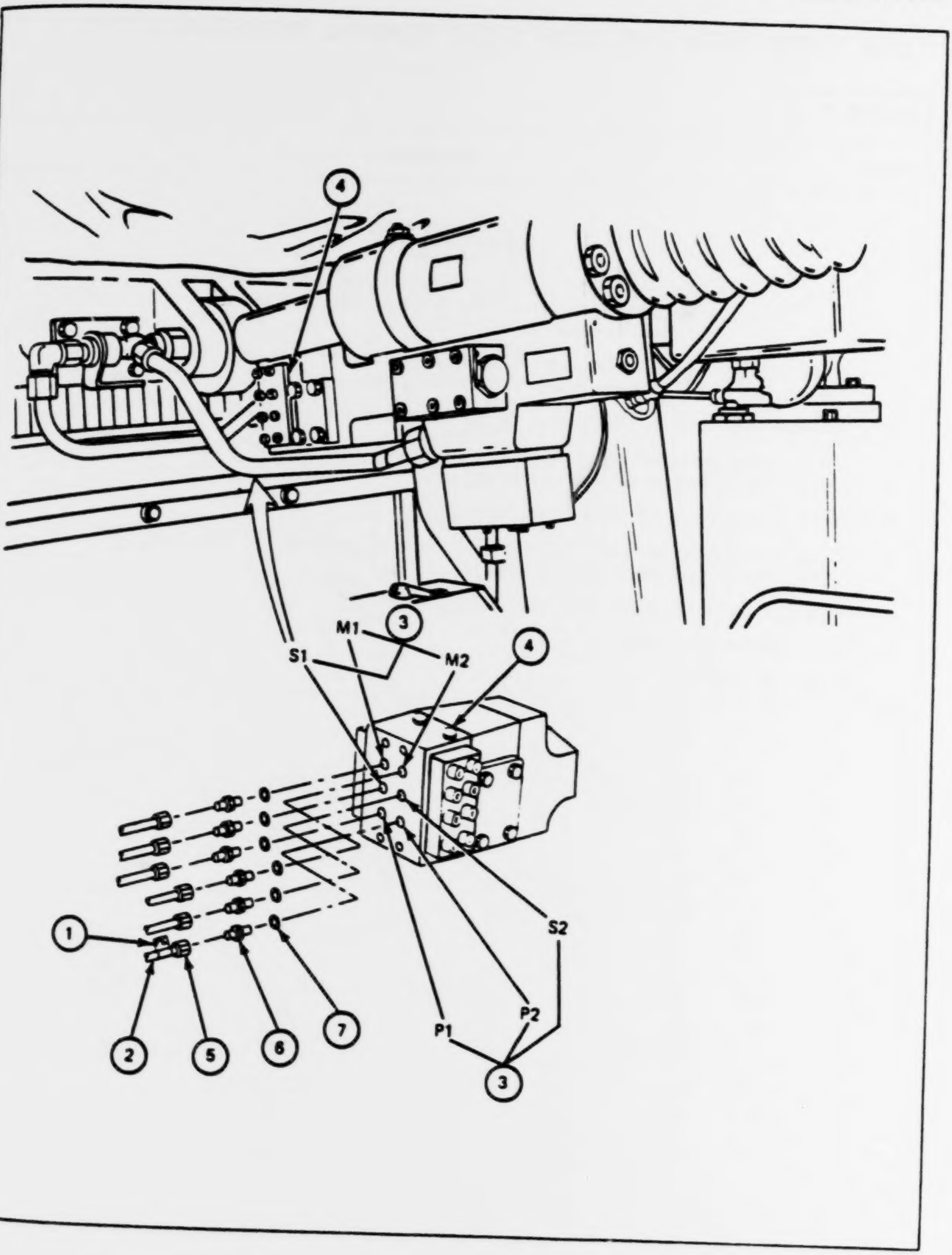
Go to Frame 2 if elevation valve is removed from vehicle.

Equipment condition applies only if task is being done on vehicle.

15-14. LOCK VALVE AND RELIEF VALVE REMOVAL PROCEDURE (CONT)

FRAME 1

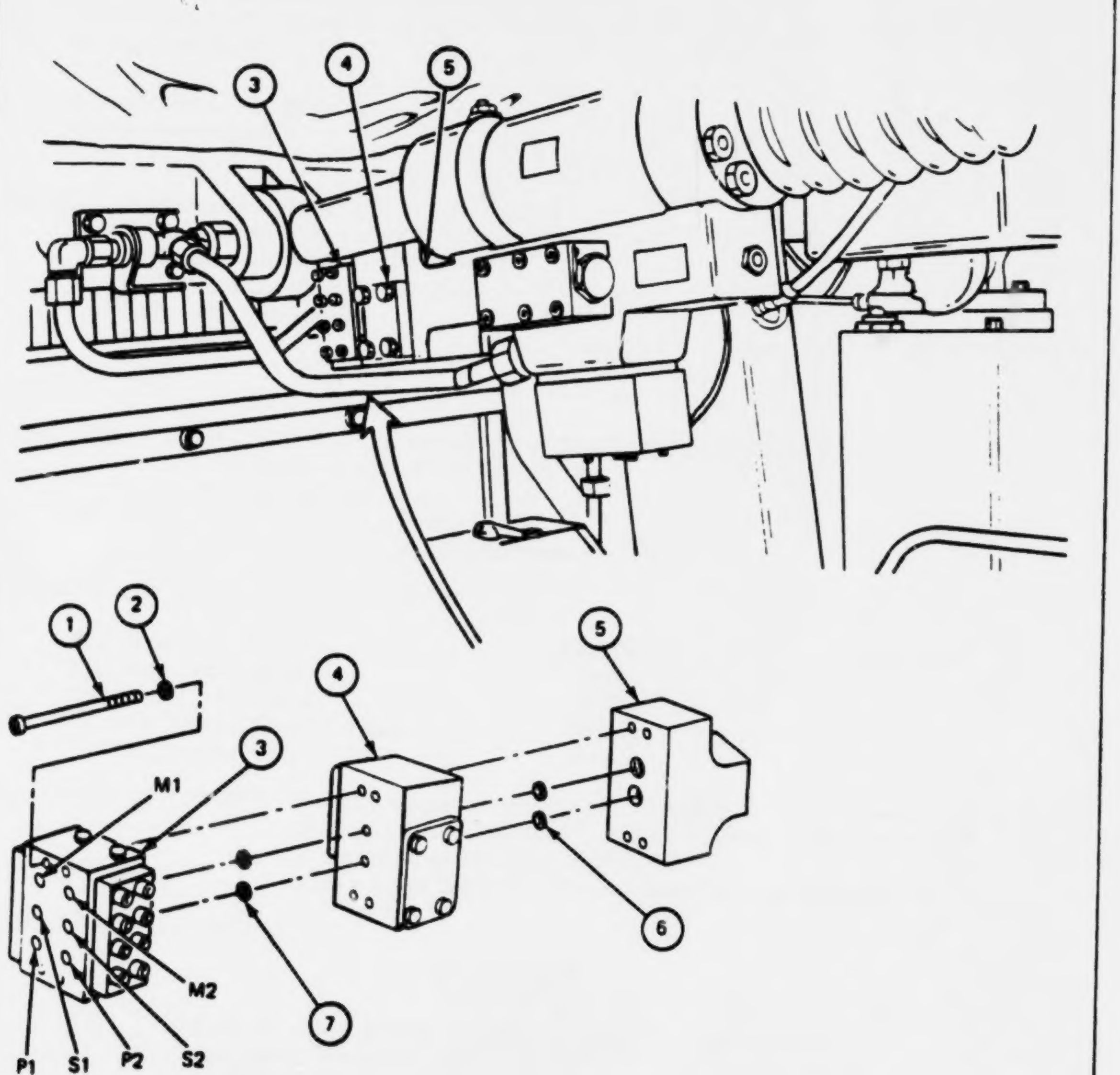
Step	Procedure
	WARNING Before removing hydraulic tubes or parts, hydraulic system pressure must be lowered to 0 psi. Hydraulic fluid under pressure can hurt you.
1.	Lower hydraulic system pressure to 0 psi (TM-20-2-3).
2.	Using masking tape (1), tag each of six hydraulic tubes (2) with port identification markings (3) on lock valve (4) (JPG).
	WARNING Ports M1 and M2 in elevation lock valve (4) may have hydraulic oil under pressure from manual accumulator. Loosen hydraulic tube until oil under pressure comes out before disconnecting hydraulic tubes.
3.	Using 9/16" wrench on tube assembly nut (5), and 11/16" wrench on nipple (6), remove six tube assembly nuts (5) from six nipples (6).
4.	Separate six tube assemblies (2) from six nipples (6).
	NOTE Do steps 5 and 6 only if lock valve is bad.
5.	Using 11/16" wrench, remove six nipples (6) from lock valve (4).
6.	Using O-ring extractor tool, remove six preformed packings (7) from six nipples (6) (JPG). Throw preformed packings away.
7.	Plug tube assembly nuts (5) and lock valve (4) ports twelve places. GO TO FRAME 2


S1
M1
M2
S2
P1
P2

15-14. LOCK VALVE AND RELIEF VALVE REMOVAL PROCEDURE (CONT)

FRAME 2

Step	Procedure
	CAUTION Lock valve (3) and relief valve (4) are both held to manifold (5) by screws (1). When screws are removed, both valves come off.
1.	Using 1/4" hex head socket wrench, remove four screws (1) and four lockwashers (2) holding lock valve (3) and relief valve (4) to manifold (5).
2.	Separate lock valve (3) and relief valve (4) from manifold (5).
3.	Using O-ring extractor tool, remove two preformed packings (6) from relief valve (4) (JPG). Throw preformed packings away.
4.	Remove lock valve (3) from relief valve (4).
5.	Using O-ring extractor tool, remove two preformed packings (7) from lock valve (3) (JPG). Throw preformed packings away.
6.	Plug lock valve (3) ports and relief valve (4) ports.
7.	Plug manifold (5) ports.
	END OF TASK


M1
M2
P1
S1
P2
S2

15-15. LOCK VALVE AND RELIEF VALVE INSTALLATION PROCEDURE

TOOLS: 1/4" socket head screw key (Allen wrench)
1/4" hex head socket (3/8" drive)
9/16" open end wrench
11/16" open end wrench
3/8" drive torque wrench (0 to 150 inch-pounds)
4" extension (3/8" drive)
O-ring extractor kit

4" extension (3/8" drive)
O-ring extractor kit

SUPPLIES: Preformed packings (MS 28778-4) (six)
Preformed packings (MS 28775-014) (two)
Preformed packings (546925) (two)
Hydraulic fluid (item 10, App. A)
Rags (item 21, App. A)

PERSONNEL: One

REFERENCES: TM 9-2350-257-10 for procedures to elevate gun and traverse turret
TM 9-2350-257-20-2-3 for procedures to:
Service hydraulic filter
Bleed hydraulic system
JPG for procedure to install preformed packings

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Elevating Mechanism	FO-3	9
Gunner's Control Box	FO-1	2
Driver's Master Control Panel	FO-4	10
Turret Traverse Lock	FO-4	6

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
Gunner's control box ELEV/TRAV POWER switch set to OFF
Turret traverse lock set to LOCKED
105-mm gun depressed and tied down to front lifting eye

GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in tubing or parts. Dirt can damage equipment. Hydraulic lines must be connected to port as marked on tags to keep from damaging equipment.

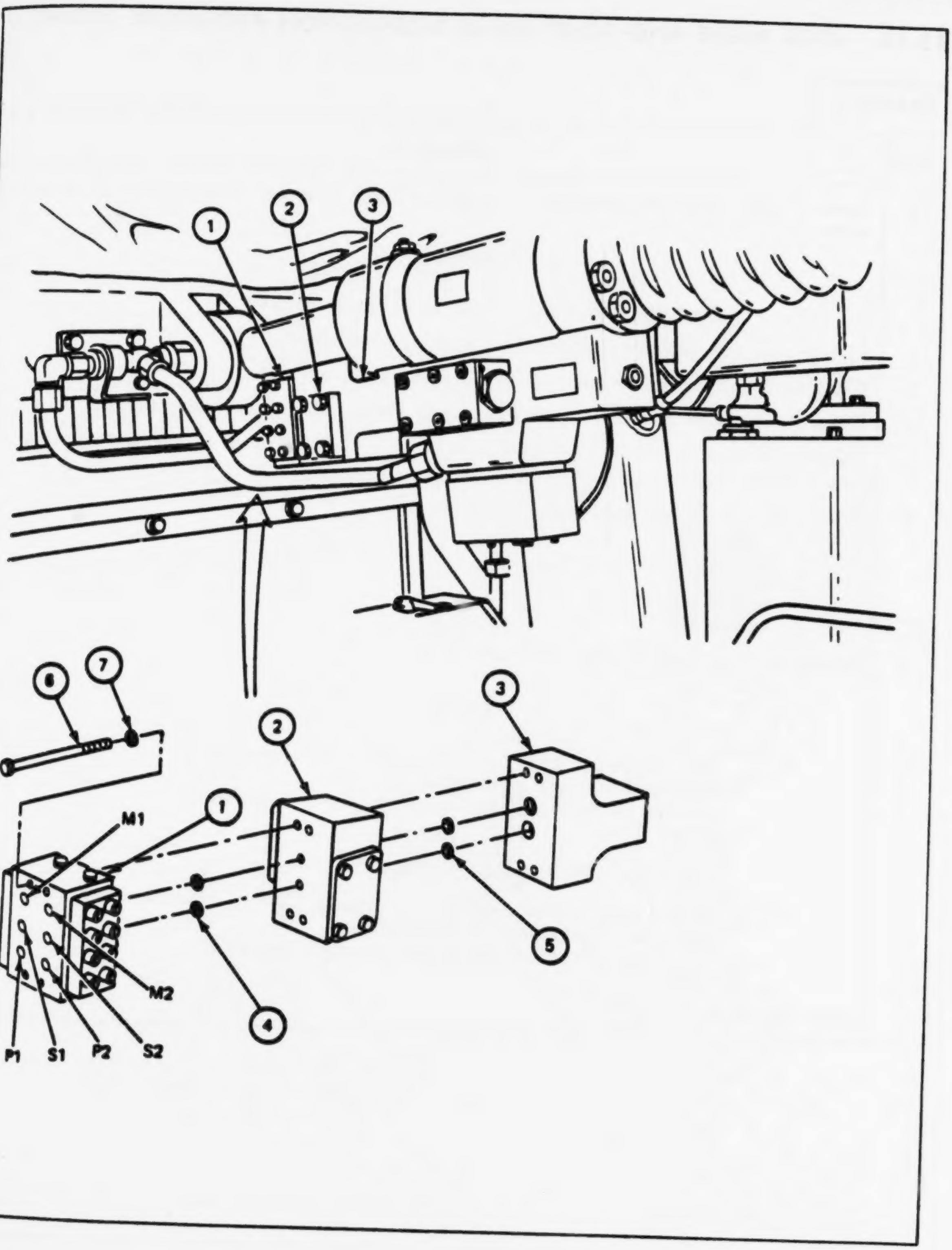
NOTE

Equipment condition applies only if task is being done on vehicle.

15-15. LOCK VALVE AND RELIEF VALVE INSTALLATION PROCEDURE (CONT)

FRAME 1

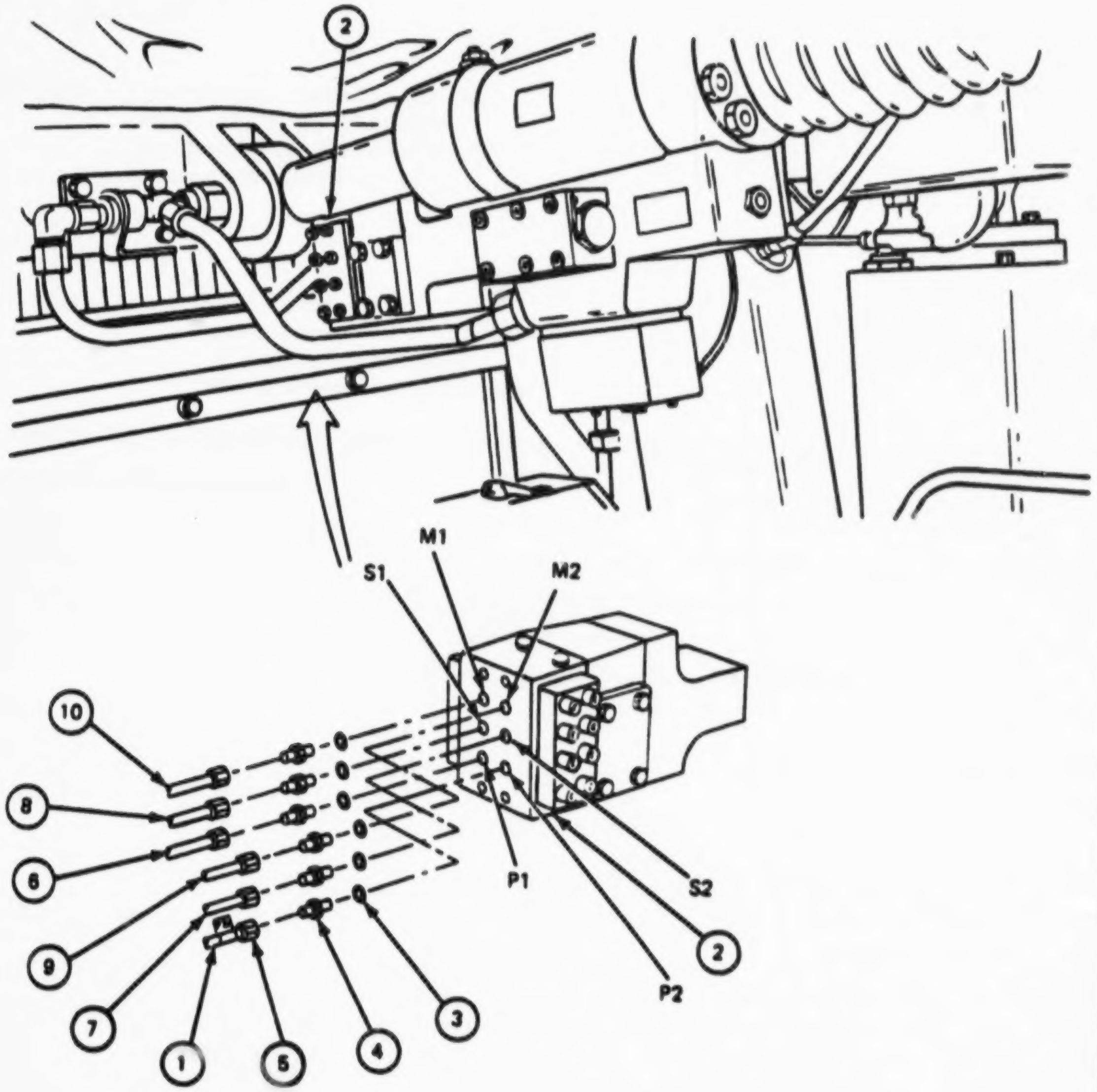
Step	Procedure
	NOTE Lock valve (1) and relief valve (2) are both held to manifold (3) by screws (6). Both valves are attached to manifold (3) together.
1.	Remove two plugs from lock valve (1), four plugs from relief valve (2), and two plugs from manifold (3).
2.	Lightly coat two new preformed packings (4) (546925) with hydraulic fluid.
3.	Put two preformed packings (4) in lock valve (1) ports (JPG).
4.	Lightly coat two new preformed packings (5) (MS 28775-014) with hydraulic fluid.
5.	Put two preformed packings (5) in relief valve (2) ports (JPG).
6.	Using four screws (6) and four lockwashers (7), join relief valve (2) to lock valve (1).
7.	Using 1/4" Allen wrench, attach joined lock valve (1) and relief valve (2) to manifold (3) with four screws (6) and four lockwashers (7).
8.	Using 1/4" hex head socket with torque wrench, torque four screws (6) to between 100 and 125 inch-pounds (JPG).
	NOTE Go to frame 2 only if task is being done on vehicle. GO TO FRAME 2


M1
M2
P1
S1
P2
S2

15-15. LOCK VALVE AND RELIEF VALVE INSTALLATION PROCEDURE (CONT)

FRAME 2

Step	Procedure
1.	Remove plugs from tube assembly (1) tagged P2 and from port hole marked P2 in lock valve (2).
	NOTE Do steps 2 thru 4 only if lock valve (2) was replaced.
2.	Lightly coat new preformed packing (3) with hydraulic fluid.
3.	Using O-ring extractor tool, put preformed packing (3) on nipple (4) (JPG).
4.	Using 11/16" wrench, attach nipple (4) to port marked P2 on lock valve (2).
5.	Using 9/16" wrench on tube assembly nut (5), and 11/16" wrench on nipple (4), attach tube assembly (1) to nipple (4).
6.	Repeat steps 1 through 5 for tube assemblies: (6) tagged P1 (7) tagged S2 (8) tagged S1 (9) tagged M2 (10) tagged M1.
7.	Remove six tags from six tube assemblies (1).
	NOTE Do following tasks if this procedure completes maintenance of hydraulic system. If other maintenance must be done, omit following tasks. Follow-on Maintenance Action Required: Service turret hydraulic system filter (TM-20-2-3). Bleed turret hydraulic system (TM-20-2-3). Check gun elevation and turret traversing operation (TM-10).
	END OF TASK


M1
S1
M2
P1
S2
P2

15-16. LOCK VALVE DISASSEMBLY PROCEDURE

TOOLS: 3/16" socket head screw key (Allen wrench)
9/16" combination wrench
Slip joint pliers
O-ring extractor kit
Scraper
Stiff bristled brush
Fine stone

SUPPLIES: Lint-free cloth (item 21, App. A)
Screws (MS 35225-21) (three)
Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

PERSONNEL: One

REFERENCES: JPG for procedures to:
Clean parts
Inspect and repair parts
Remove preformed packings

PRELIMINARY PROCEDURES: Remove lock valve (para 15-14)

GENERAL INSTRUCTIONS:

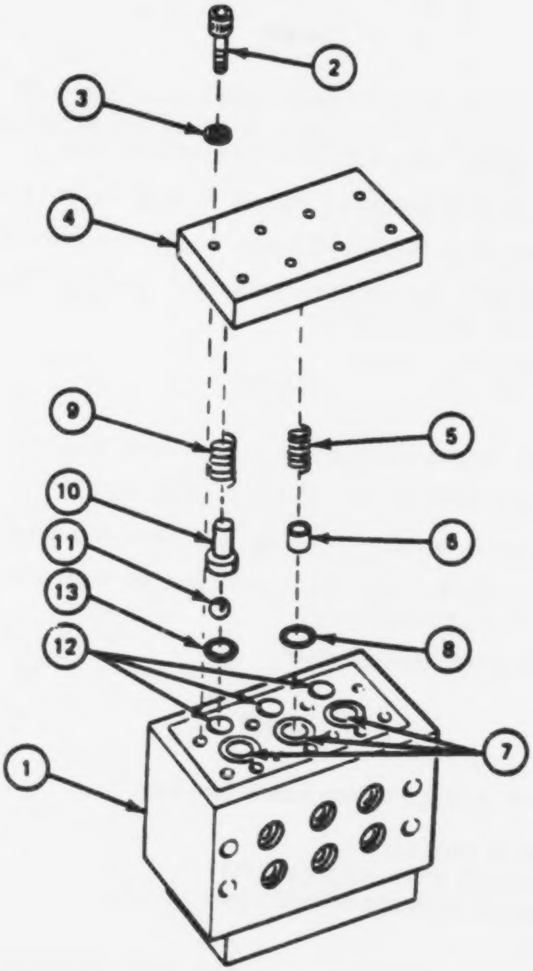
CAUTION

Keep dirt from getting in parts. Dirt can damage equipment.

15-16. LOCK VALVE DISASSEMBLY PROCEDURE (CONT)

FRAME 1

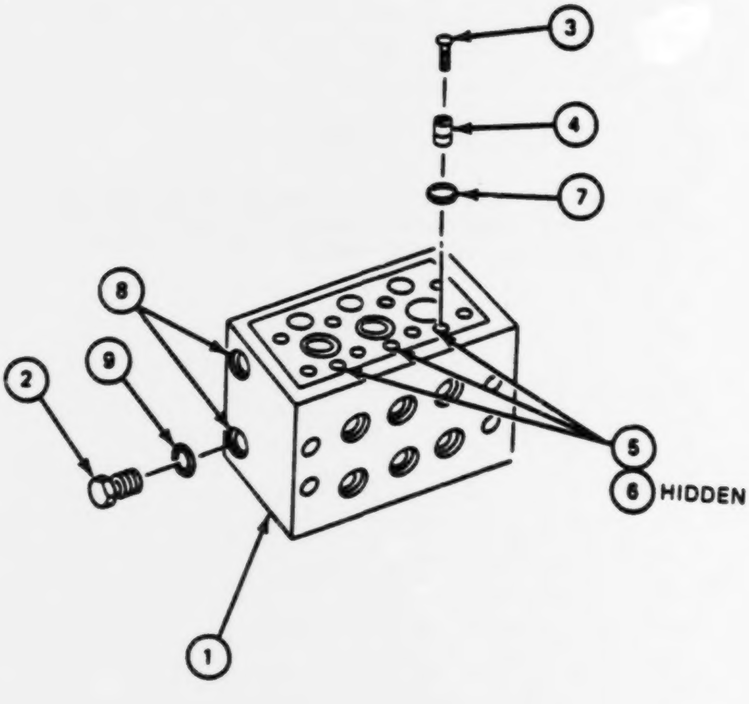
Step	Procedure
	WARNING Hold plate (4) to body (1) when removing eight screws (2). Springs (5) and (9) are under tension. Springs and plate can fly out and hurt you.
	CAUTION Three spools and three sleeves in three holes (7) of body (1) are matched pairs. Spools are not removed from body (1). If they fall out, put them back the way they were.
1.	Put body (1) on work surface with six ports facing you and side without plugs to left.
2.	Using Allen wrench, remove eight screws (2) and eight lockwashers (3) holding plate (4) to body (1).
3.	Separate plate (4) from body (1).
4.	Remove three springs (5) and three cups (6) from three holes (7) in body (1).
5.	Using O-ring extractor tool, remove three preformed packings (8) from three holes (7) in body (1) (JPG). Throw preformed packings away.
6.	Put parts removed in step 4 on clean lint-free cloth.
7.	Remove three springs (9), three guides (10), and three ball bearings (11) from three holes (12) in body (1).
8.	Throw ball bearings away.
9.	Using O-ring exctractor tool, remove three preformed packings (13) from three holes (12) in body (1) (JPG). Throw preformed packings away.
10.	Put parts removed in step 7 on clean lint-free cloths.
	GO TO FRAME 2



15-16. LOCK VALVE DISASSEMBLY PROCEDURE (CONT)

FRAME 2

Step	Procedure
1.	Turn body (1) upside down with plugs (2) facing to the left.
2.	Repeat Frame 1 for second plate on top of body (1).
	NOTE Three plugs (4) have tapped hole in end. Screw (3) is put in tapped hole and plug is pulled out to remove. Three screws (MS 35225-21), are used to do this.
3.	Put three screws (3) in three plugs (4) located in three holes (5) of body (1).
4.	Using pliers, pull three plugs (4) out of body (1). Do not remove three pins (6).
5.	Using O-ring extractor tool, remove three preformed packings (7) from three plugs (4) (JPG). Throw preformed packings away.
	NOTE Do not remove three screws (3) from three plugs (4).
6.	Put three plugs (4) and three screws (3) on lint-free cloth.
7.	Using combination wrench, remove two plugs (2) from two plug holes (8) in body (1).
8.	Using O-ring exctractor tool, remove two preformed packings (9) from two plugs (2) (JPG). Throw preformed packings away.
9.	Put two plugs (2) on clean lint-free cloth.
	NOTE Follow-on Maintenance Action Required: Clean all parts (JPG). Inspect and repair all parts (JPG). Do detail inspection of parts (para 15-13).
	END OF TASK


6 HIDDEN

15-17. LOCK VALVE ASSEMBLY PROCEDURE

TOOLS: 3/16" socket head screw key (Allen wrench)
9/16" combination wrench
Slip joint pliers
O-ring extractor kit

SUPPLIES: Lint-free cloth (item 21, App. A)
Lock valve repair kit, NSN 1015-00-928-6192
Hydraulic fluid (item 10, App. A)

PERSONNEL: One

REFERENCES: JPG for procedure to install preformed packings

GENERAL INSTRUCTIONS:

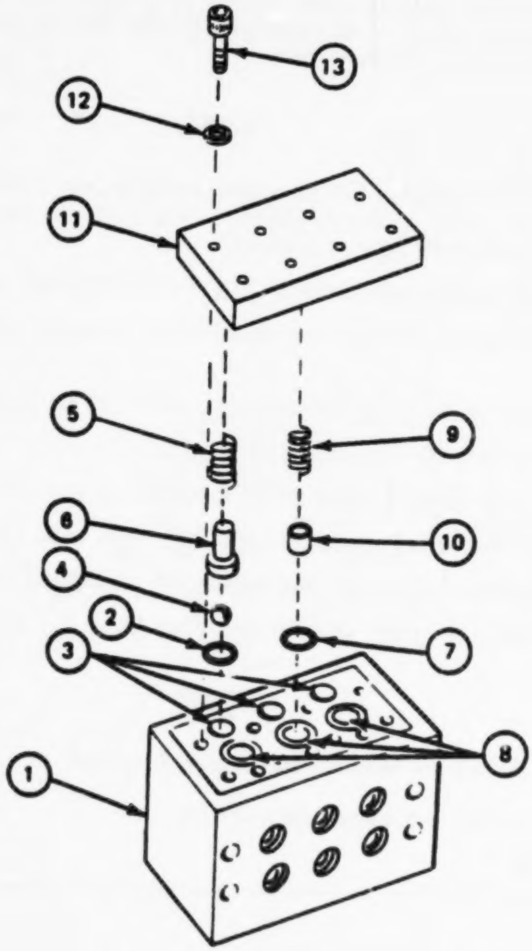
CAUTION

Keep dirt from getting in parts. Dirt can damage equipment. Sweat will corrode internal parts. Use lint-free cloth to wipe off internal parts and to put them in place.

15-17. LOCK VALVE ASSEMBLY PROCEDURE (CONT)

FRAME 1

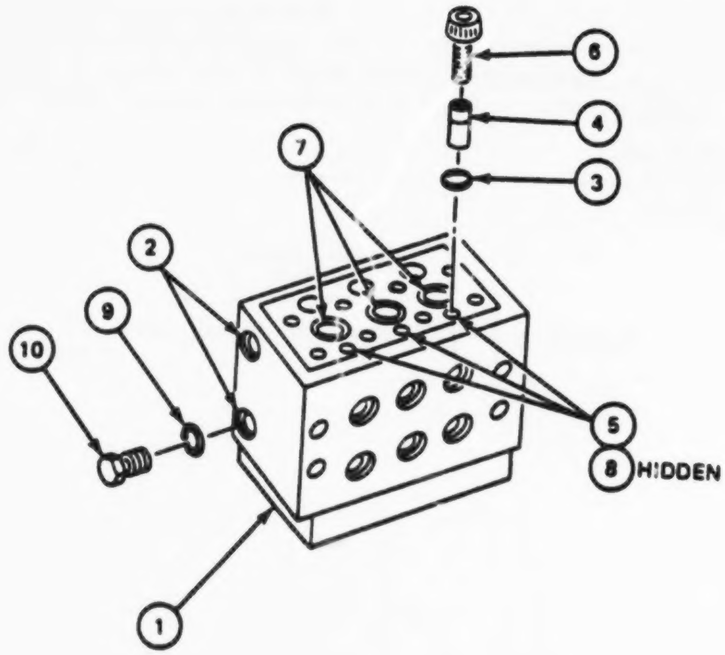
Step	Procedure
1.	Put body (1) on work surface with six ports facing you and side without plugs to left.
2.	Lightly coat three preformed packings (2) (546926) with hydraulic fluid.
3.	Put three preformed packings (2) in three holes (3) in body (1) (JPG).
4.	Using lint-free cloth, put three ball bearings (4) in three holes (3) in body (1).
5.	Using lint-free cloth, put three springs (5) on three guides (6).
6.	Using lint-free cloth, put three guides (6) with three springs (5) in three holes (3) in body (1).
7.	Lightly coat three preformed packings (7) (546928) with hydraulic fluid.
8.	Put three preformed packings (7) in three holes (8) in body (1) (JPG).
9.	Using lint-free cloth, put three springs (9) in three cups (10).
10.	Using lint-free cloth, put three cups (10) with three springs (9) in three holes (8) in body (1).
	NOTE When plate (11) is attached to body (1), three springs (5) and three springs (9) must be placed in six counterbores in plate.
11.	Using Allen wrench, attach plate (11) to body (1) with eight lockwashers (12) and eight screws (13).
	GO TO FRAME 2



15-17. LOCK VALVE ASSEMBLY PROCEDURE (CONT)

FRAME 2

Step	Procedure
1.	Turn body (1) upside down with two plug holes (2) facing to the left.
	CAUTION Do not remove three spools (7) or three pins (8) from three holes (5) in body (1). If they fall out, put them back the way they were.
	NOTE Three plugs (4) have tapped holes in end. Three screws (6), used during disassembly (para 15-16), are used to push three plugs in body (1).
2.	Lightly coat three preformed packings (3) (MS 28775-006) with hyraulic fluid.
3.	Using O-ring extractor tool, put three preformed packings (3) in groove on three plugs (4) (JPG).
4.	Using hands, push three plugs (4) in three holes (5) in body (1) as far as they will go.
5.	Remove three screws (6) from three plugs (4).
6.	Repeat Frame 1 for second plate to be installed on top of body (1).
7.	Lightly coat two preformed packings (9) (7602960) with hydraulic fluid.
8.	Using O-ring extractor tool, put two preformed packings (9) on two plugs (10) (JPG).
9.	Using wrench, put two plugs (10) in two plug holes (2) in body (1).
	NOTE Follow-on Maintenance Action Required: Install lock valve (para 15-15).
	END OF TASK


8 HIDDEN

15-18. RELIEF VALVE INSPECTION PROCEDURE

TOOLS: 6" machinist steel rule

PRELIMINARY PROCEDURES: Disassemble relief valve (para 15-19)

GENERAL INSTRUCTIONS:

NOTE

If any part is bad, order repair part or next higher assembly as required.

FRAME 1

Step	Procedure
1.	Using steel rule, measure free overall length of two springs. If either spring is less than 1-1/2", spring is bad. END OF TASK

15-19. RELIEF VALVE DISASSEMBLY PROCEDURE

TOOLS: 9/16'' combination wrench
O-ring extractor kit
Scraper
Stiff bristled brush
Fine stone

SUPPLIES: Lint-free cloth (item 21, App. A)
Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

PERSONNEL: One

REFERENCES: JPG for procedures to:
Clean parts
Inspect and repair parts
Remove preformed packings

PRELIMINARY PROCEDURES: Remove relief valve (para 15-14)

GENERAL INSTRUCTIONS:

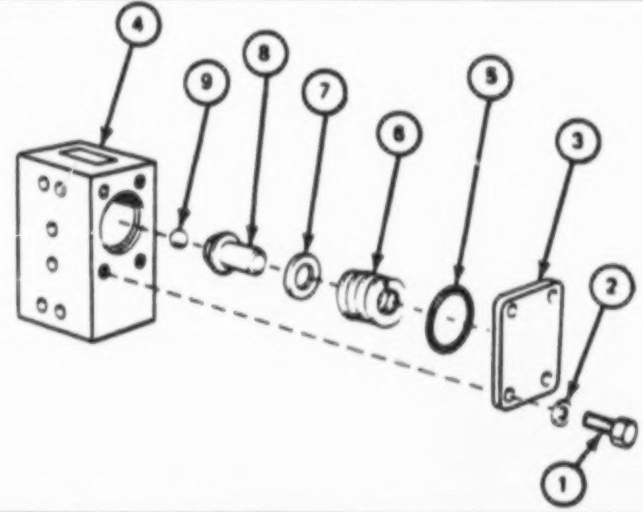
CAUTION

Keep dirt from getting in parts. Dirt can damage equipment.

15-19. RELIEF VALVE DISASSEMBLY PROCEDURE (CONT)

FRAME 1

Step	Procedure
	WARNING Hold plate (3) to block (4) when removing four screws (1). Spring (6) is under pressure. Spring (6) and plate (3) can fly out and hurt you.
1.	Using wrench, remove four screws (1) and four lockwashers (2) that attach plate (3) to block (4). Remove plate.
2.	Using O-ring extractor tool, remove preformed packing (5), spring (6), shims (7), guide (8), and ball bearing (9) from block (4) (JPG). Put parts on lint-free cloth.
3.	Throw preformed packing (5) away.
4.	Repeat steps 1 through 3 for parts installed under plate (3) in lower part of block (4).
	NOTE Follow-on Maintenance Action Required: Clean all parts (JPG). Inspect and repair all parts (JPG). Do detail inspection of parts (para 15-18).
	END OF TASK



15-20. RELIEF VALVE ASSEMBLY PROCEDURE

TOOLS: 9/16" combination wrench

SUPPLIES: Lint-free cloth (item 21, App. A)
Hydraulic fluid (item 10, App. A)
Preformed packings (546940) (two)

PERSONNEL: One

REFERENCES: JPG for procedure to install preformed packings

GENERAL INSTRUCTIONS:

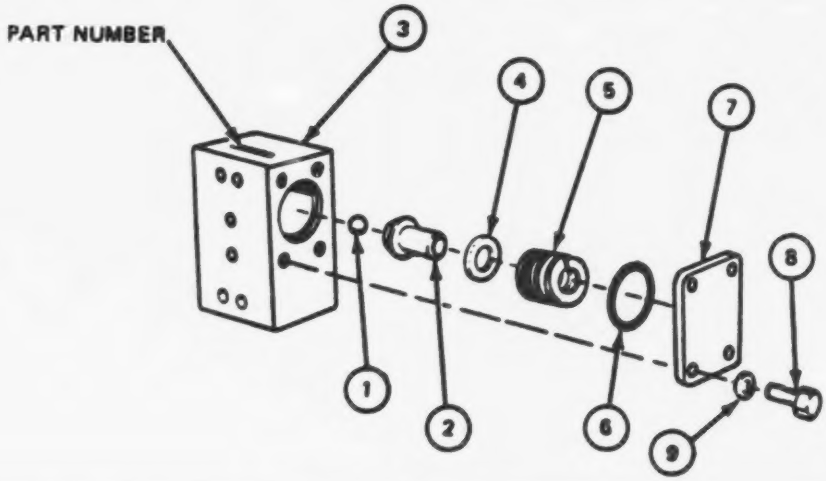
CAUTION

Keep dirt from getting in parts. Dirt can damage equipment.

15-20. RELIEF VALVE ASSEMBLY PROCEDURE (CONT)

FRAME 1

Step	Procedure
	CAUTION Sweat will corrode internal parts. Use clean lint-free cloth to wipe off internal parts and put them in place.
1.	Put ball bearing (1) and guide (2) in upper part of block (3).
2.	Put shim (4) and spring (5) on guide (2) in block (3).
3.	Lightly coat new preformed packing (6) with hydraulic fluid.
4.	Put preformed packing (6) in block (3) (JPG).
5.	Put plate (7) on block (3) with part number showing.
6.	Using wrench, attach plate (7) to block (3) with four screws (8) and four lockwashers (9).
7.	Repeat steps 1 through 6 to install parts in lower part of block (3).
	NOTE Follow-on Maintenance Action Required: Install relief valve (para 15-15).
	END OF TASK



15-21. LEFT PILOT CHECK VALVE REMOVAL PROCEDURE

TOOLS: 3/16" socket head screw key wrench (Allen wrench)
O-ring extractor kit

SUPPLIES: Plugs for manifold and check valve ports (six)
Small container
Rags (item 21, App. A)

PERSONNEL: One

REFERENCES: TM 9-2530-257-20-2-3 for procedure to lower hydraulic pressure
JPG for procedure to remove preformed packings

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Elevating Mechanism	FO-3	9
Gunner's Control Box	FO-1	2
Driver's Master Control Panel	FO-4	10
Turret Traverse Lock	FO-4	6

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
Gunner's control box ELEV/TRAV POWER switch set to OFF
Turret traverse lock set to LOCKED
105-mm gun depressed and tied down to front lifting eye

GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in tubing or parts. Dirt can damage equipment.

NOTE

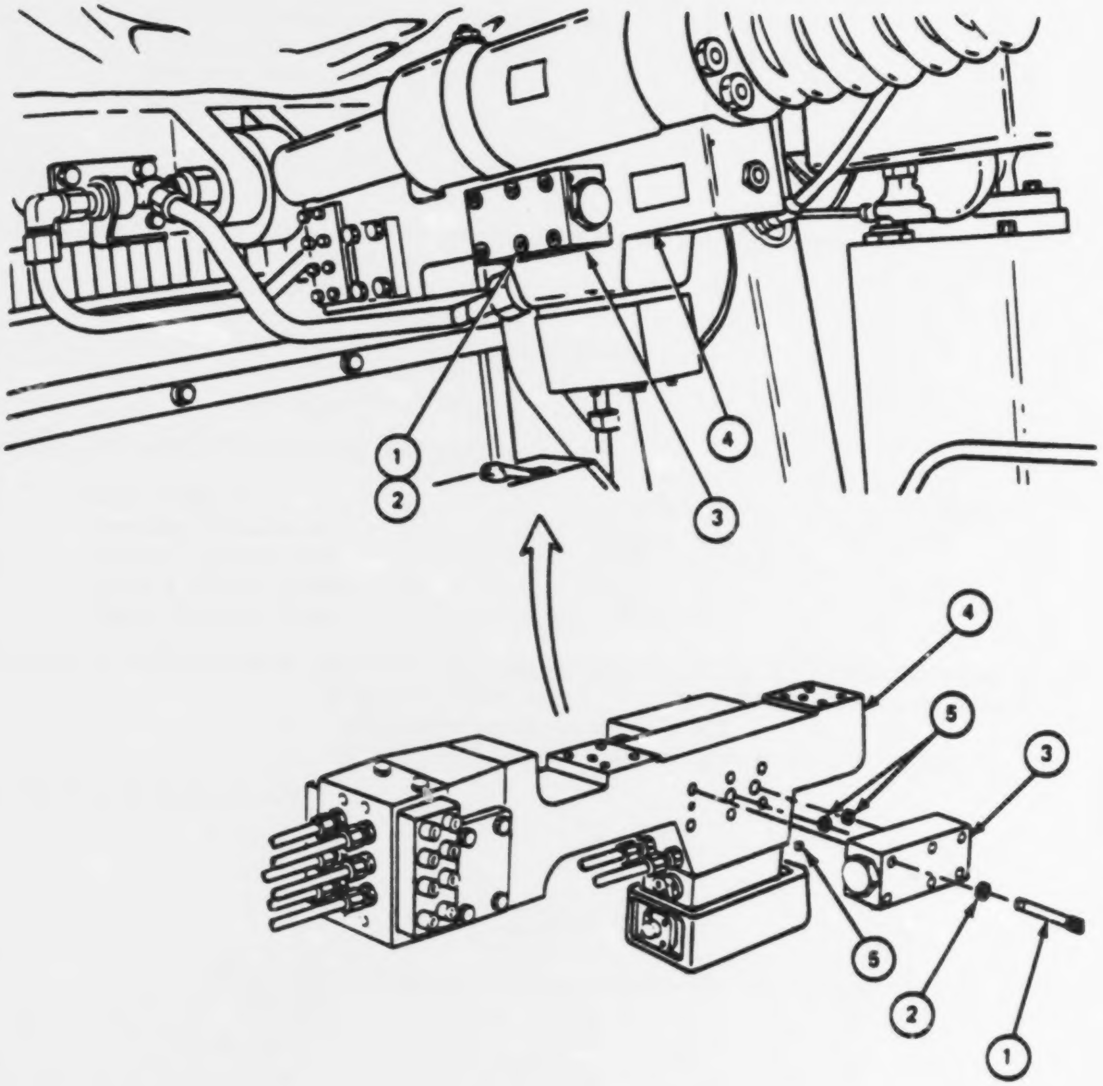
Use small container to catch hydraulic fluid which leaks when hydraulic lines are disconnected. Use rags to wipe up spilled hydraulic fluid.

Equipment condition applies only if task is being done on vehicle.

15-21. LEFT PILOT CHECK VALVE REMOVAL PROCEDURE (CONT)

FRAME 1

Step	Procedure
	WARNING Before removing hydraulic tubes or parts, hydraulic system pressure must be lowered to 0 psi. Hydraulic fluid under pressure can hurt you.
1.	Lower hydraulic system pressure to 0 psi (TM-20-2-3).
2.	Using Allen wrench, remove six screws (1) and six lockwashers (2) holding left pilot check valve (3) to manifold (4).
3.	Separate left pilot check valve (3) from manifold (4).
4.	Using O-ring extractor tool, remove three preformed packings (5) from manifold (4) po (JPG). Throw preformed packings away.
7.	Plug manifold (4) ports and left pilot check valve (3) ports, six places.
	END OF TASK



15-22. LEFT PILOT CHECK VALVE INSTALLATION PROCEDURE

TOOLS: O-ring extractor kit
3/16" socket head screw key (Allen wrench)
3/8" drive torque wrench (0-150 inch-pounds)
3/16" hex head socket (3/8" drive)

SUPPLIES: Preformed packings (MS 28775-016) (two)
Preformed packing (MS 28775-012)
Hydraulic fluid (item 10, App. A)
Rags (item 21, App. A)

PERSONNEL: One

REFERENCES: TM 9-2350-257-10 for procedures to elevate gun and traverse turret
JPG for procedures to:
  Use torque wrench
  Install preformed packings
TM 9-2350-257-20-2-3 for procedures to:
  Service hydraulic filter
  Bleed hydraulic system

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Elevating Mechanism	FO-3	9
Gunner's Control Box	FO-1	2
Driver's Master Control Panel	FO-4	10
Turret Traverse Lock	FO-4	6

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
Gunner's control box ELEV/TRAV POWER switch set to OFF
Turret traverse lock set to LOCKED
105-mm gun depressed and tied down to front lifting eye

GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in tubing or parts. Dirt can damage equipment.

NOTE

Equipment condition applies only if task is being done on vehicle.

15-22. LEFT PILOT CHECK VALVE INSTALLATION PROCEDURE (CONT)

FRAME 1

Step	Procedure
1.	Remove three plugs from pilot check valve (1) and three plugs from manifold (2).
2.	Lightly coat three new preformed packings (3) with hydraulic fluid.
3.	Using O-ring extractor tool, put three preformed packings (3) in manifold (2) ports (JPG).
4.	Using Allen wrench, attach pilot check valve (1) to manifold (2) with six screws (4) an six lockwashers (5).
5.	Using hex head socket and torque wrench, torque six screws (4) to between 60 and 80 inch-pounds (JPG).

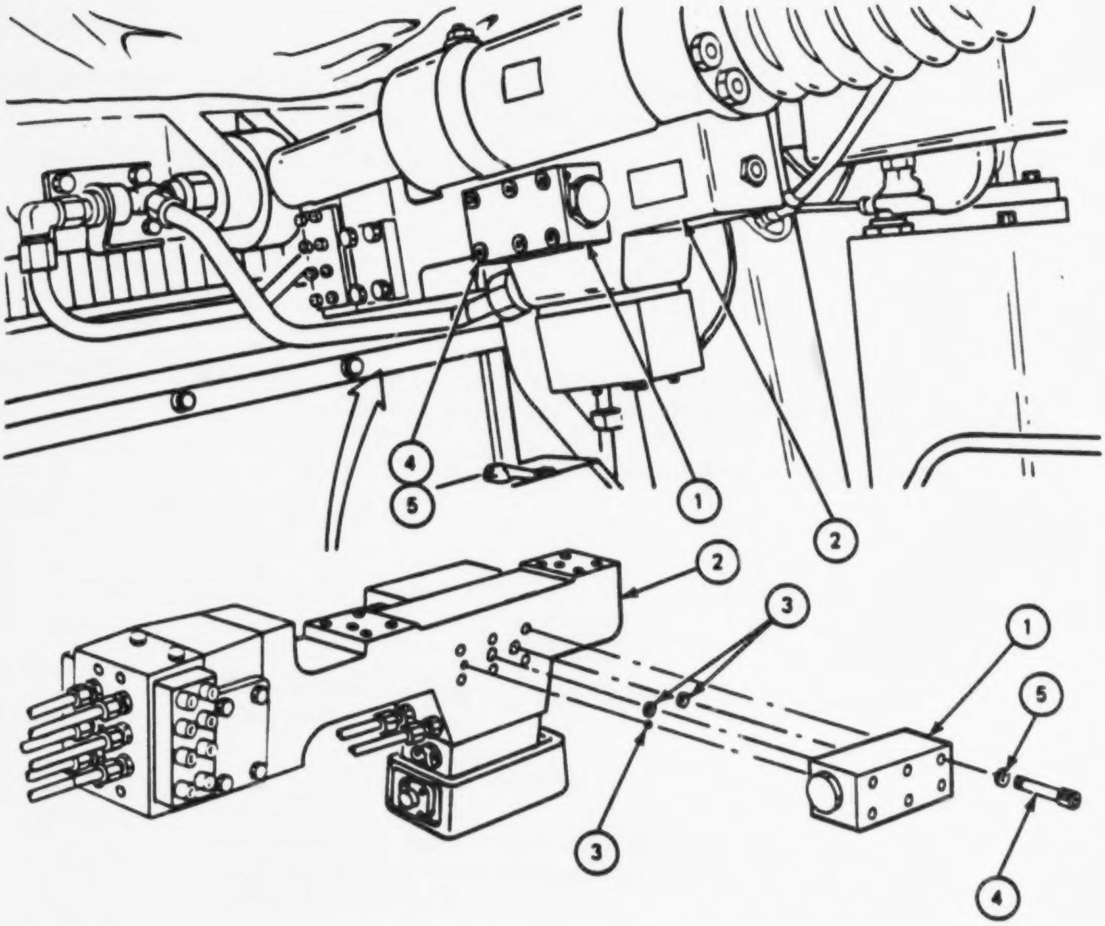
NOTE

Do following tasks if this procedure completes maintenance of hydraulic system.
If other maintenance must be done, omit following tasks.

Follow-on Maintenance Action Required:

Service turret hydraulic system filter (TM-20-2-3).
Bleed turret hydraulic system (TM-20-2-3).
Check gun elevation and turret traversing operation (TM-10).

END OF TASK



15-23. RIGHT PILOT CHECK VALVE REMOVAL PROCEDURE

TOOLS: O-ring extractor kit
3/16" socket head screw key (Allen wrench)

SUPPLIES: Plugs for manifold and check valve ports (six)
Small container
Rags (item 21, App. A)

PERSONNEL: One

REFERENCES: TM 9-2350-257-20-2-3 for procedure to lower hydraulic pressure
JPG for procedure to remove preformed packings

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Elevating Mechanism	FO-3	9
Gunner's Control Box	FO-1	2
Driver's Master Control Panel	FO-4	10
Turret Traverse Lock	FO-4	6

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
Gunner's control box ELEV/TRAV POWER switch set to OFF
Turret traverse lock set to LOCKED
105-mm gun depressed and tied down to front lifting eye

GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in tubing or parts. Dirt can damage equipment.

NOTE

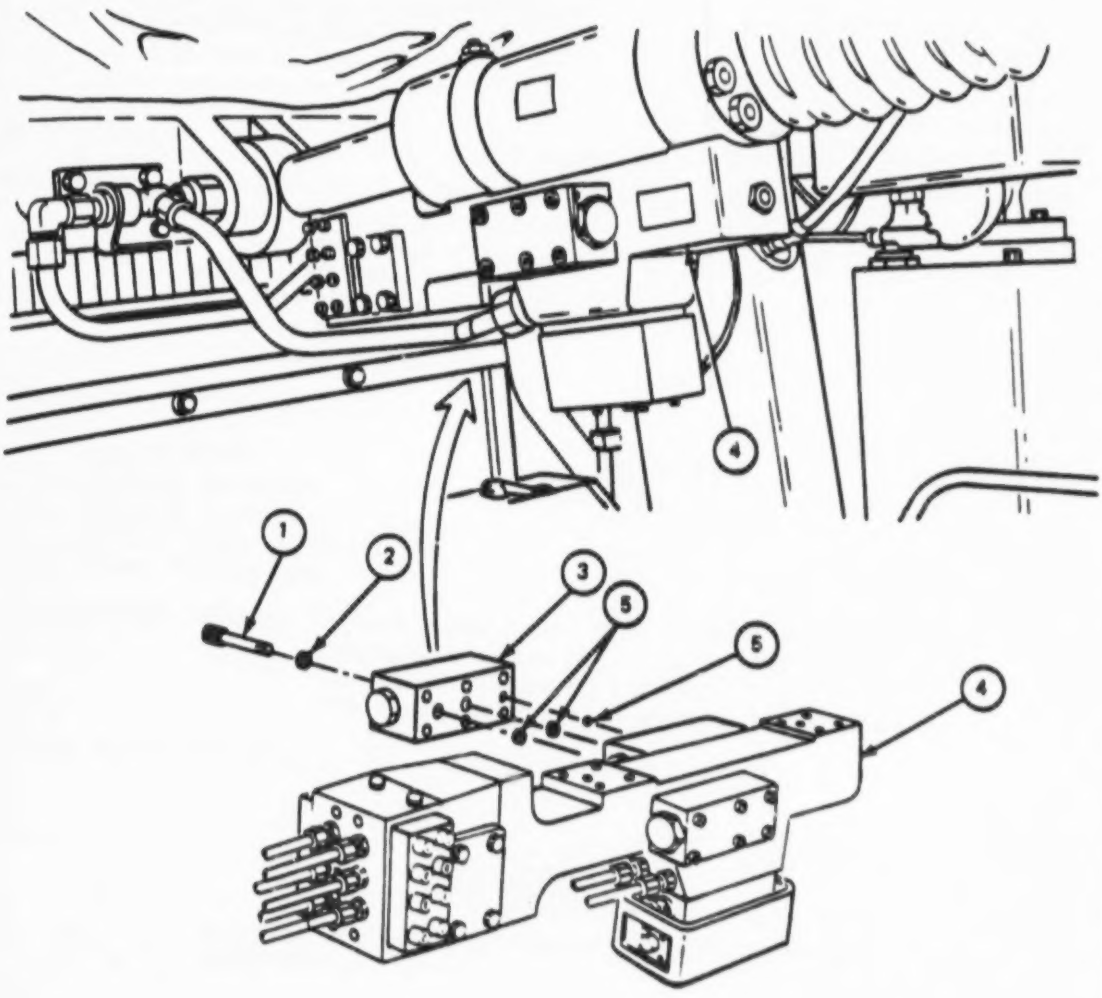
Use small container to catch hydraulic fluid which leaks when hydraulic lines are disconnected. Use rags to wipe up spilled hydraulic fluid.

Equipment condition applies only if task is being done on vehicle.

15-23. RIGHT PILOT CHECK VALVE REMOVAL PROCEDURE (CONT)

FRAME 1

Step	Procedure
	WARNING Before removing hydraulic tubes or parts, hydraulic system pressure must be lowered to 0 psi. Hydraulic fluid under pressure can hurt you.
1.	Lower hydraulic system pressure to 0 psi (TM-20-2-3).
2.	Using Allen wrench, remove six screws (1) and six lockwashers (2) holding right pilot check valve (3) to manifold (4).
3.	Separate right pilot check valve (3) from manifold (4).
4.	Using O-ring extractor tool, remove three preformed packings (5) from manifold (4) ports (JPG). Throw preformed packings away.
5.	Plug manifold (4) ports and right pilot check valve (3) ports, six places.
	END OF TASK



15-24. RIGHT PILOT CHECK VALVE INSTALLATION PROCEDURE

TOOLS: O-ring extractor kit
3/16" socket head screw key (Allen wrench)
3/8" drive torque wrench (0 to 150 inch-pounds)
3/16" hex head socket (3/8" drive)

SUPPLIES: Preformed packings (MS 28775-016) (two)
Preformed packing (MS 28775-012)
Hydraulic fluid (item 10, App. A)
Rags (item 21, App. A)

PERSONNEL: One

REFERENCES: TM 9-2350-257-10 for procedures to elevate gun and traverse turret
JPG for procedures to:
  Use torque wrench
  Install preformed packings
TM 9-2350-257-20-2-3 for procedures to:
  Service hydraulic filter
  Bleed hydraulic system

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Elevating Mechanism	FO-3	9
Gunner's Control Box	FO-1	2
Driver's Master Control Panel	FO-4	10
Turret Traverse Lock	FO-4	6

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
Gunner's control box ELEV/TRAV POWER switch set to OFF
Turret traverse lock set to LOCKED
105-mm gun depressed and tied down to front lifting eye

GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in tubing or parts. Dirt can damage equipment.

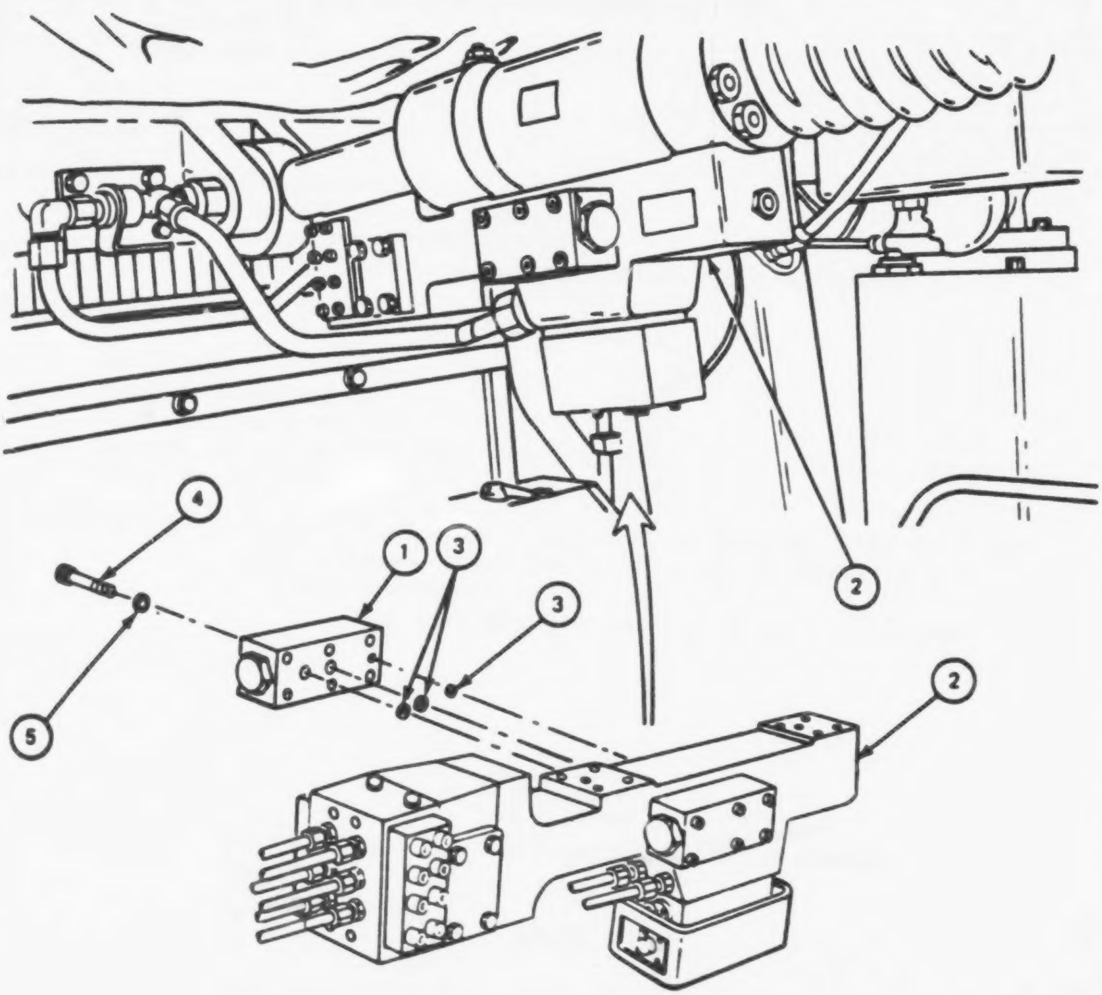
NOTE

Equipment condition applies only if task is being done on vehicle.

15-24. RIGHT PILOT CHECK VALVE INSTALLATION PROCEDURE (CONT)

FRAME 1

Step	Procedure
1.	Remove three plugs from pilot check valve (1) and three plugs from manifold (2).
2.	Lightly coat three new preformed packings (3) with hydraulic fluid.
3.	Using O-ring extractor tool, put three preformed packings (3) in manifold (2) ports (JPG).
4.	Using Allen wrench, attach pilot check valve (1) to manifold (2) with six screws (4) and six lockwashers (5).
5.	Using hex head socket and torque wrench, torque six screws (4) to between 60 and 80 inch-pounds (JPG).
	NOTE Do following tasks if this procedure completes maintenance of hydraulic system. If other maintenance must be done, omit following tasks. Follow-on Maintenance Action Required: Service turret hydraulic system filter (TM-20-2-3). Bleed turret hydraulic system (TM-20-2-3). Check gun elevation and turret traversing operation (TM-10).
	END OF TASK



15-25. ELEVATION SERVOVALVE REMOVAL PROCEDURE

TOOLS: No. 2 cross tip screwdriver (Phillips)
5/16" open end wrench
O-ring extractor kit

SUPPLIES: Plugs for manifold and servovalve assembly ports (eight)
Small container
Rags (item 21, App. A)

PERSONNEL: One

REFERENCES: JPG for procedures to:
Remove preformed packings
Disconnect electrical connectors
TM 9-2350-257-20-2-3 for procedure to lower hydraulic pressure

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Elevating Mechanism	FO-3	9
Gunner's Control Box	FO-1	2
Driver's Master Control Panel	FO-4	10
Turret Traverse Lock	FO-4	6

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
Gunner's control box ELEV/TRAV POWER switch set to OFF
Turret traverse lock set to LOCKED
105-mm gun depressed and tied down to front lifting eye

GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in tubing or parts. Dirt can damage equipment.

NOTE

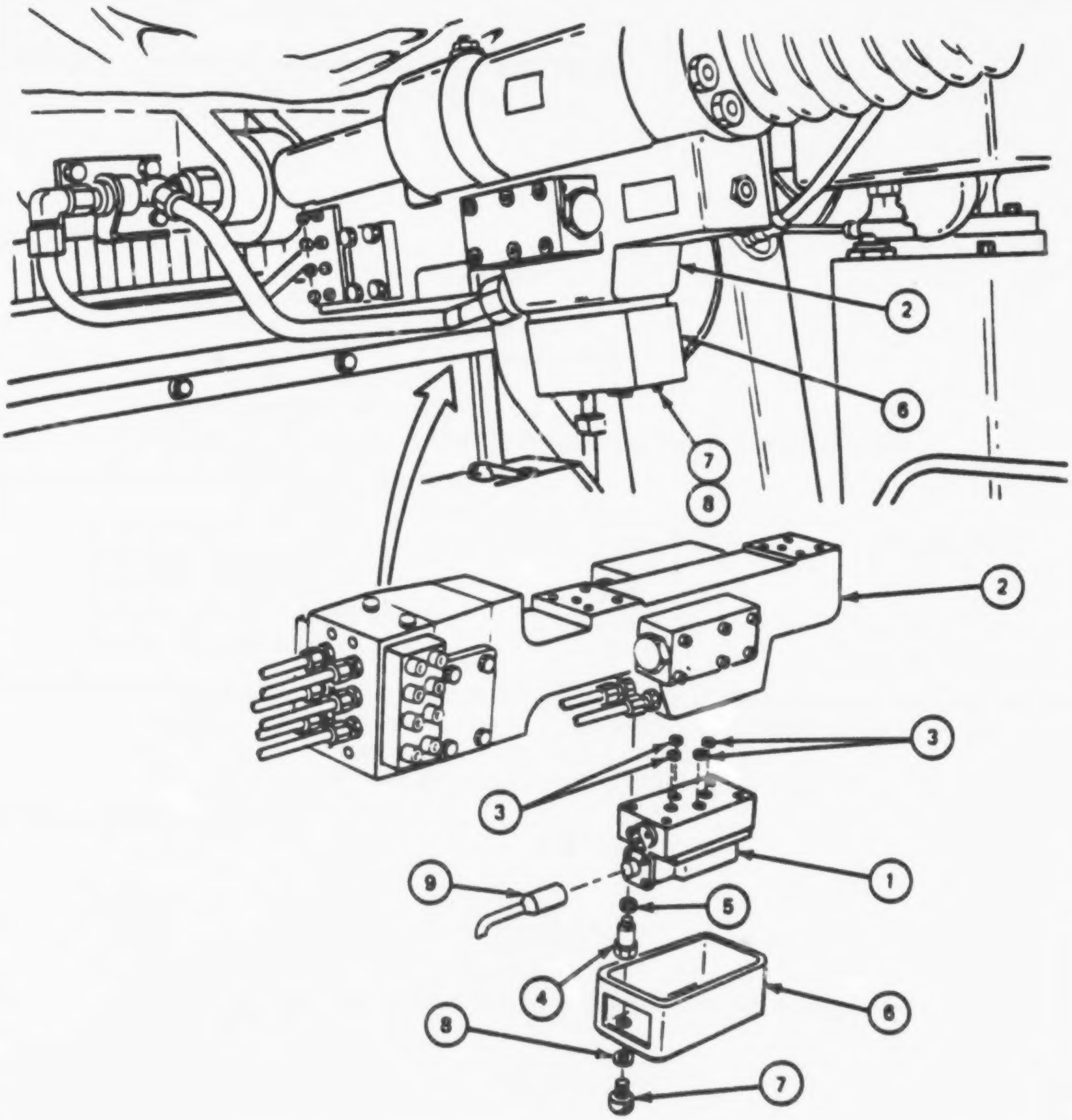
Use small container to catch hydraulic fluid which leaks when hydraulic lines are disconnected. Use rags to wipe up spilled hydraulic fluid.

Equipment condition applies only if task is being done on vehicle.

15-25. ELEVATION SERVOVALVE REMOVAL PROCEDURE (CONT)

FRAME 1

Step	Procedure
	WARNING Before removing hydraulic tubes or parts, hydraulic system pressure must be lowered to 0 psi. Hydraulic fluid under pressure can hurt you.
1.	Lower hydraulic pressure to 0 psi (TM-20-2-3).
2.	Disconnect electrical connector (1) from elevation servovalve (2) (JPG).
3.	Using screwdriver, remove four screws (3) and four lockwashers (4) holding cover (5) t elevation servovalve (2). Remove cover.
4.	Using wrench, remove four studs (6) and four lockwashers (7) holding elevation servovalve (2) to manifold (8).
5.	Separate elevation servovalve (2) from manifold (8).
6.	Using O-ring exractor tool, remove four preformed packings (9) from manifold ports (8) (JPG). Throw preformed packings away.
7.	Plug manifold (8) ports and elevation servovalve (2) ports, eight places.
	END OF TASK



15-26. ELEVATION SERVOVALVE INSTALLATION PROCEDURE

TOOLS: No. 2 cross tip screwdriver (Phillips)
5/16" open end wrench
O-ring extractor kit
1/4" drive torque wrench (0 to 60 inch-pounds)
5/16" socket (1/4" drive)

SUPPLIES: Preformed packings (MS 28775-012) (four)
Hydraulic fluid (item 10, App. A)
Rags (item 21, App. A)

PERSONNEL: One

REFERENCES: JPG for procedures to:
- Connect electrical connectors
- Use torque wrench
- Install preformed packings

TM 9-2350-257-20-2-3 for procedures to:
- Service hydraulic filter
- Bleed hydraulic system

TM 9-2350-257-10 for procedures to elevate gun and traverse turret

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Elevating Mechanism	FO-3	9
Gunner's Control Box	FO-1	2
Driver's Master Control Panel	FO-4	10
Turret Traverse Lock	FO-4	6

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
Gunner's control box ELEV/TRAV POWER switch set to OFF
Turret traverse lock set to LOCKED
105-mm gun depressed and tied down to front lifting eye

GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in tubing or parts. Dirt can damage equipment.

NOTE

Equipment condition applies only if task is being done on vehicle.

15-26. ELEVATION SERVOVALVE INSTALLATION PROCEDURE (CONT)

FRAME 1

Step	Procedure
1.	Remove four plugs from servovalve (1) and four plugs from manifold (2).
2.	Lightly coat four new preformed packings (3) with hydraulic fluid.
3.	Put four preformed packings (3) in manifold (2) ports (JPG).
4.	Using open end wrench, attach servovalve (1) to manifold (2) with four studs (4) and four lockwashers (5).
5.	Using torque wrench and 5/16" socket, torque four studs (4) to between 16 and 21 inch-pounds (JPG).
6.	Using screwdriver, attach cover (6) to servovalve (1) with four screws (7) and four lockwashers (8).
7.	Connect electrical connector (9) to servovalve (1) (JPG).

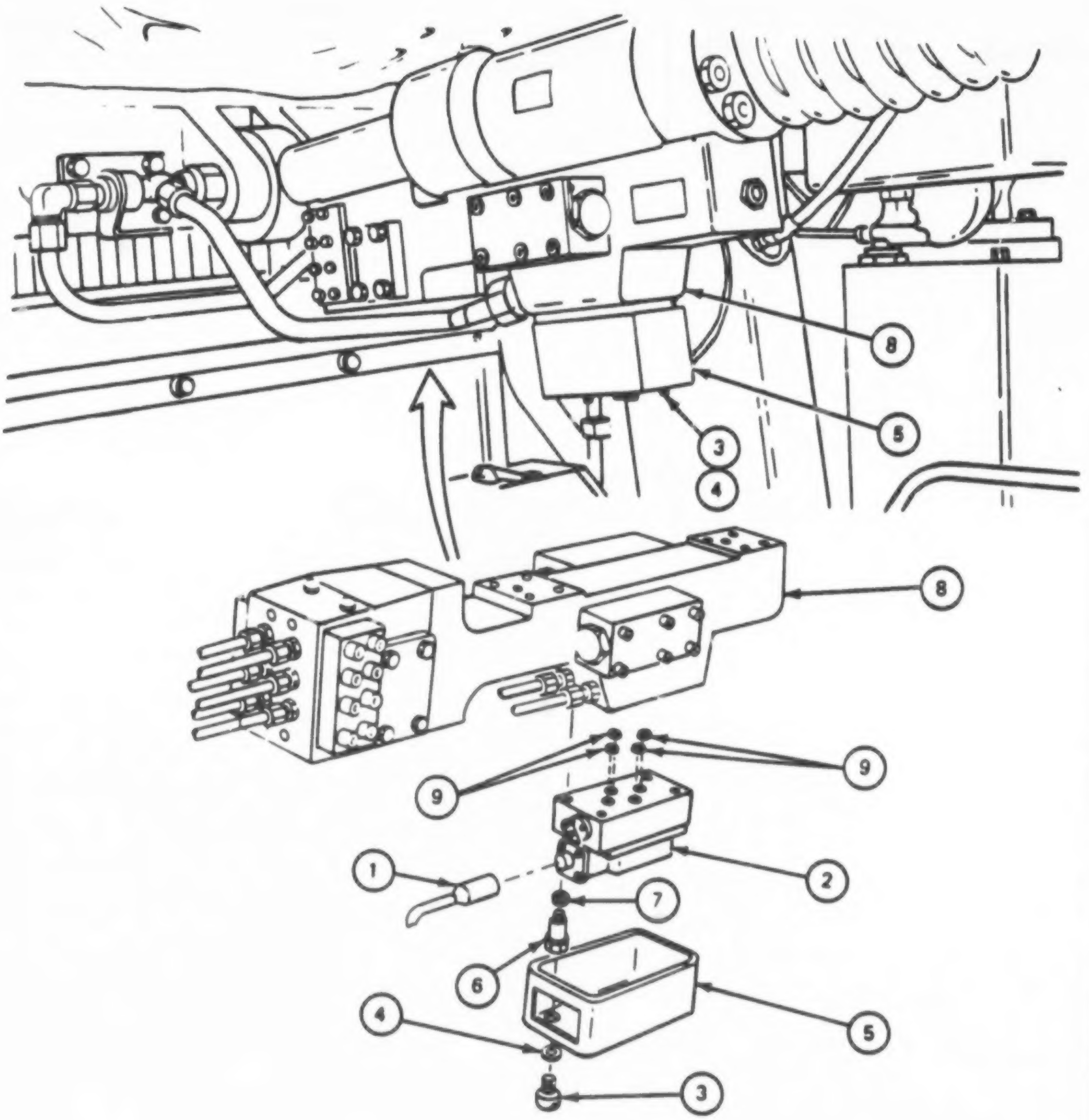
NOTE

Do following tasks if this procedure completes maintenance of hydraulic system.
If other maintenance must be done, omit following tasks.

Follow-on Maintenance Action Required:

Service turret hydraulic system filter (TM-20-2-3).
Bleed turret hydraulic system (TM-20-2-3).
Check gun elevation and turret traversing operation (TM-10).

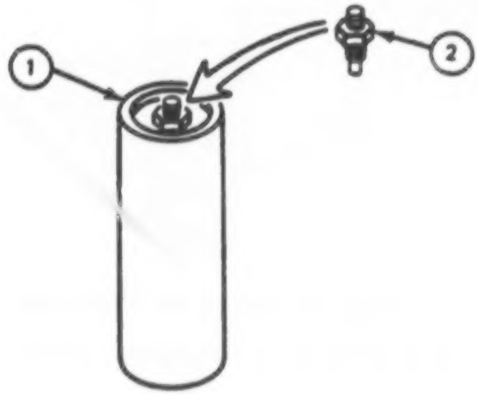
END OF TASK



CHAPTER 16
MAIN ACCUMULATOR

16-1. MAINTENANCE PROCEDURES INDEX

	Tasks					
Equipment Item	Inspection	Test	Removal	Installation	Disassembly	Assembly
1. Main Accumulator	16-2	16-3	. . .	. . . .	16-4	16-5
2. Air Valve	. . .	16-6	16-7	16-8	16-7	16-8



16-2. MAIN ACCUMULATOR INSPECTION PROCEDURE

PERSONNEL: One

PRELIMINARY PROCEDURES: Disassemble main accumulator (para 16-4)

GENERAL INSTRUCTIONS:

NOTE

If part is bad, order repair part or next higher assembly as required.

FRAME 1

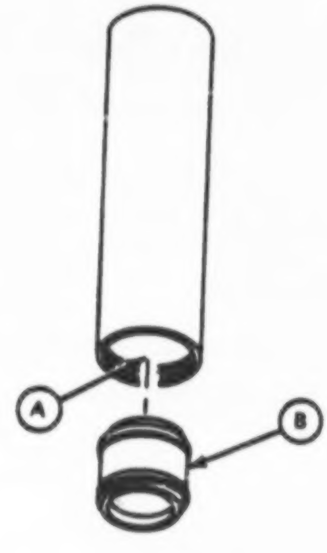
Step	Procedure
	SUPPORT SHOP WORK
1.	Take main accumulator cylinder and piston to support shop where measuring equipment is available.
2.	Make dimensional check.

Reference Letter	Point of Measurement	Measurement (in inches)
A	ID of cylinder	6.543 to 6.545
B	OD of piston	6.538 to 6.540

NOTE

Tag parts that are out of tolerance.

Step	Procedure
3.	After support shop work, return main accumulator cylinder and piston to turret shop.
	END OF TASK



Para 16-2 Cont

16-3. MAIN ACCUMULATOR TEST PROCEDURE

TEST EQUIPMENT: M3 oil pump
Pressure gauge (0-5000 psi)
Watch with sweep second hand
Suitable fittings, preformed packings, and tools

TOOLS: 3/8" combination wrench
1/16" drive pin punch
3/4" combination wrench

SUPPLIES: Hydraulic fluid (item 10, App. A)
Funnel
Container (2' long x 1' wide x 1' deep, minimum)
Pan
Lint-free cloths (item 21, App. A)
Protective shield (metal plate, 1/2" thick x 4' square or wooden board 2" thick x 4' square)

PERSONNEL: One

REFERENCES: JPG for procedures to use M3 oil pump
TM 9-2350-257-20-2-3 for procedures to:
Charge main accumulator
Remove main accumulator

EQUIPMENT CONDITION: Main accumulator removed (TM-20-2-3)

PRELIMINARY PROCEDURES: Assemble main accumulator (para 16-5)

GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in tubing or parts. Dirt can damage equipment.

NOTE

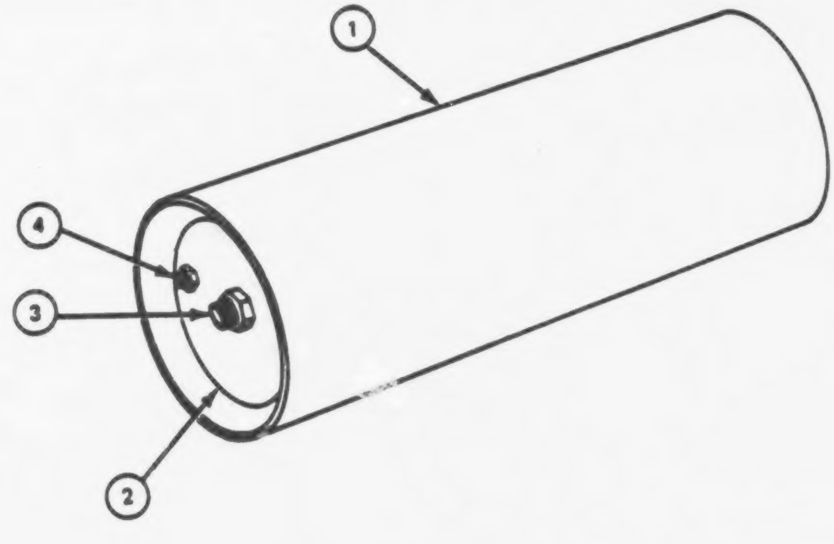
Suitable fittings, preformed packings, and tools should be used to connect test equipment to parts being tested.

If normal indication is not obtained, main accumulator is bad. Disassemble bad main accumulator (para 16-4).

16-3. MAIN ACCUMULATOR TEST PROCEDURE (CONT)

FRAME 1

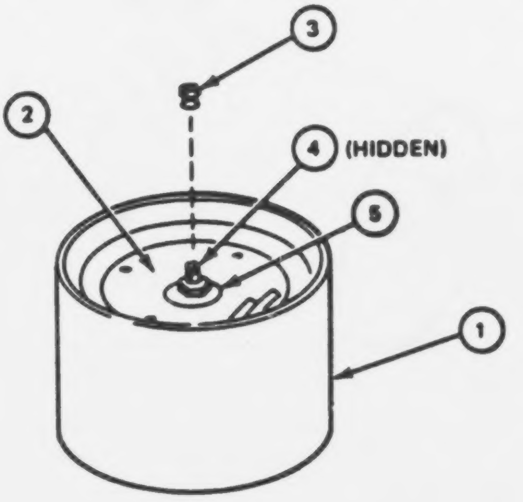
Step	Procedure
	NOTE Fluid-end cap has two ports. Gas-end cap has one port.
1.	Turn accumulator (1) on end with fluid-end cap (2) up.
2.	Remove protective plugs from port (3) and port (4).
3.	Using funnel, pour hydraulic fluid in port (3) until fluid chamber of accumulator (1) is full.
4.	Install test pressure plugs in port (3) and port (4).
	GO TO FRAME 2



16-3. MAIN ACCUMULATOR TEST PROCEDURE (CONT)

FRAME 2

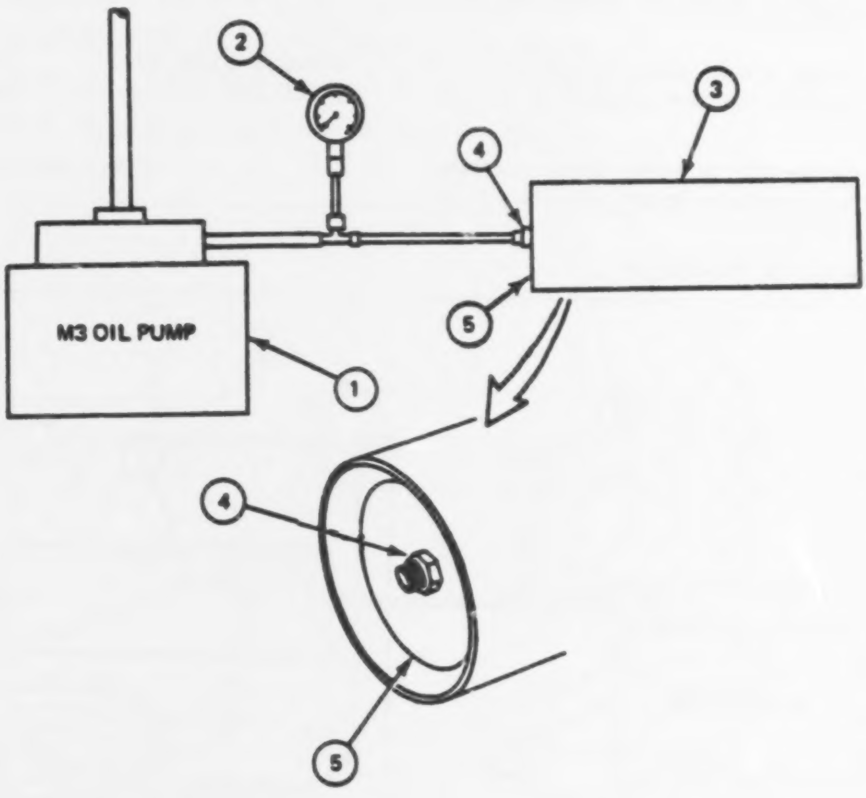
Step	Procedure
1.	Turn accumulator (1) on end with gas-end cap (2) up.
2.	Using 3/8" wrench, remove valve cap (3).
	WARNING
	Nitrogen under pressure can hurt you. Keep fingers and hands clear of valve while letting out nitrogen. Let nitrogen out slowly.
3.	Using punch, push in valve core (4) until no more nitrogen comes out of gas valve (5).
4.	Using 3/4" wrench, remove gas valve (5).
5.	Using funnel, pour hydraulic fluid in port for gas valve (5) until nitrogen chamber of accumulator (1) is full.
	GO TO FRAME 3



16-3. MAIN ACCUMULATOR TEST PROCEDURE (CONT)

FRAME 3

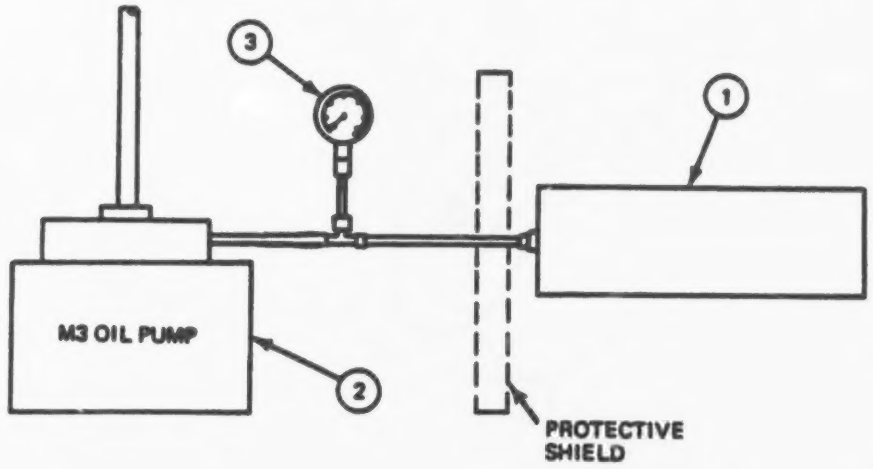
Step	Procedure
1.	Connect M3 oil pump (1) and pressure gauge (2) to accumulator (3) at port (4) of gas-end cap (5). GO TO FRAME 4



16-3. MAIN ACCUMULATOR TEST PROCEDURE (CONT)

FRAME 4

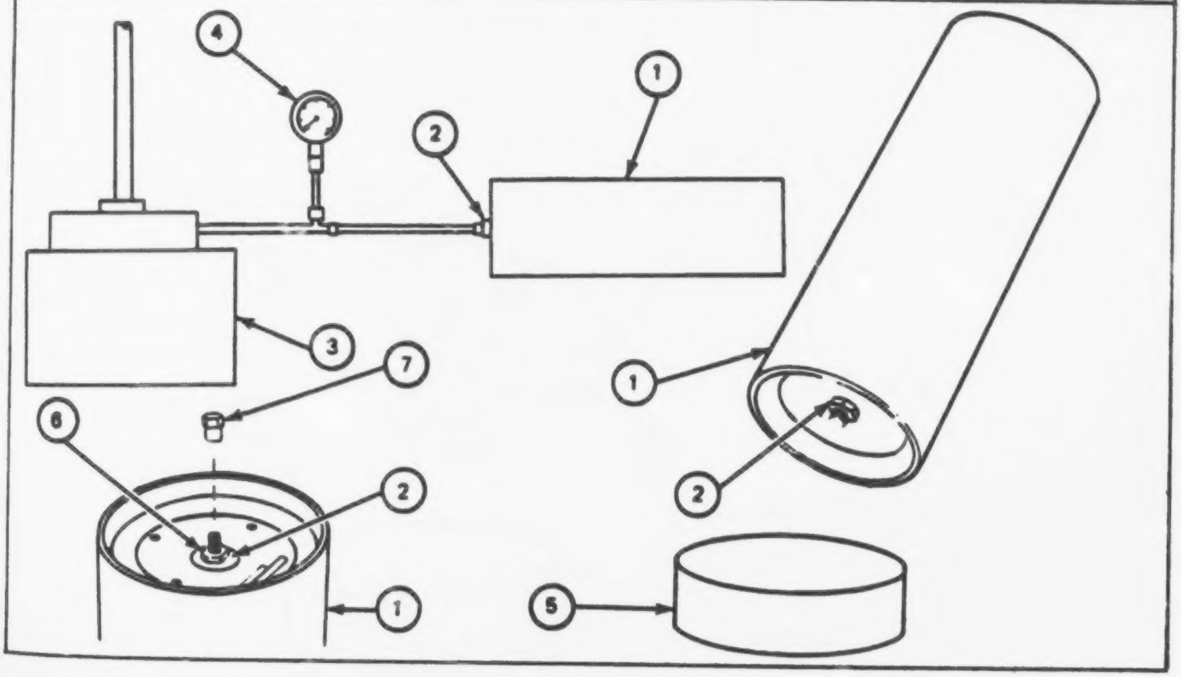
Step	Procedure	Normal Indication	Probable Fau
	WARNING Hydraulic fluid under pressure can hurt or kill you. Steps 2 thru 4 must be done at 3000 psi. Do not pressurize accumulator until protective shield is put between accumulator and you.		
1.	Put protective shield in front of accumulator (1).	. . .	. . .
2.	Operate M3 oil pump (2) until pressure gauge (3) reads 3000 psi (JPG).	. . .	. . .
3.	Using watch, check accumulator pressure for five minutes.	Pressure gauge (3) reads 3000 psi.	Bad preforme packings or bad rings.
4.	Using M3 oil pump, lower pressure until pressure gauge (3) reads 0 psi (JPG).	. . .	. . .
	GO TO FRAME 5		



16-3. MAIN ACCUMULATOR TEST PROCEDURE (CONT)

FRAME 5

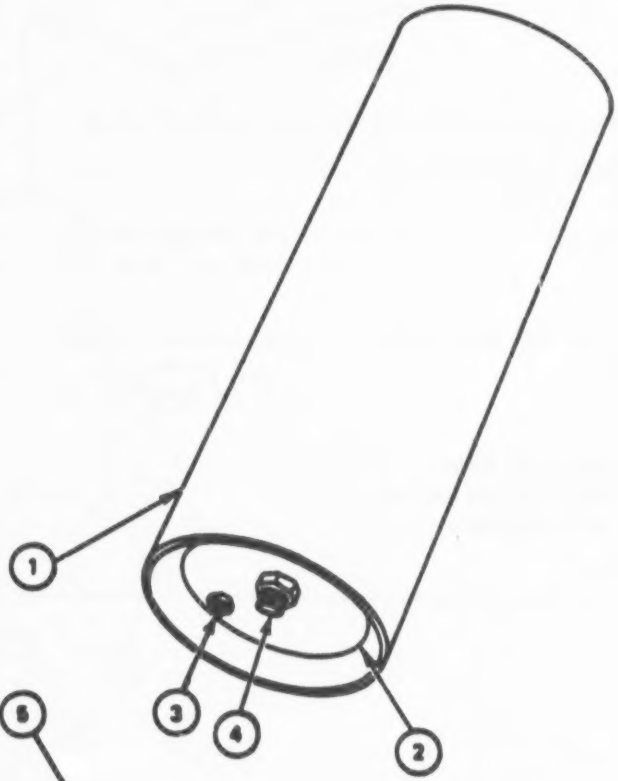
Step	Procedure
	WARNING Hydraulic fluid under pressure can hurt or kill you. Do not disconnect M3 oil pump from accumulator until pressure gauge reads 0 psi.
1.	Turn accumulator (1) on end with gas-end port (2) up. Disconnect M3 oil pump (3) and pressure gauge (4) from accumulator (1).
2.	Turn accumulator (1) on end with gas-end port (2) down, so fluid will drain from nitrogen chamber into pan (5).
3.	Allow accumulator (1) to stand on end for fifteen minutes and drain completely.
4.	Turn accumulator (1) on end with gas-end port (2) up.
5.	Using 3/4" wrench, put gas valve (6) in gas-end port (2).
6.	Using 3/8" wrench, put valve cap (7) on gas valve (6).
	GO TO FRAME 6



16-3. MAIN ACCUMULATOR TEST PROCEDURE (CONT)

FRAME 6

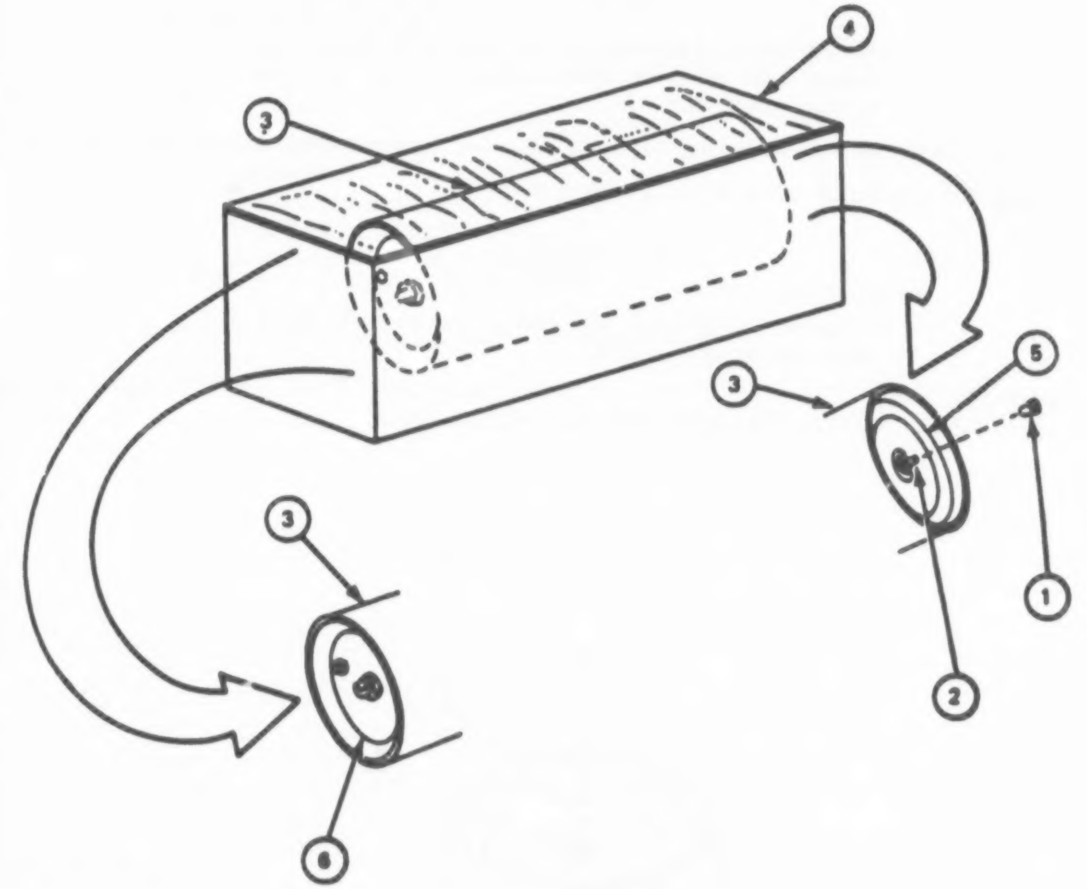
Step	Procedure
1.	Turn accumulator (1) on end with fluid-end cap (2) up.
2.	Remove test pressure plugs from port (3) and port (4).
3.	Turn accumulator (1) on end with fluid-end cap (2) down, so fluid will drain fully from port (3) and port (4) into pan (5).
	GO TO FRAME 7



16-3. MAIN ACCUMULATOR TEST PROCEDURE (CONT)

FRAME 7

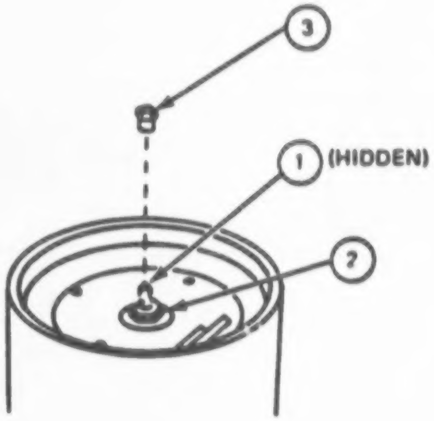
Step	Procedure	Normal Indication	Probable Fault
1.	Using 3/8" wrench, remove valve cap (1) from gas valve (2).	. . .	. . .
2.	Charge accumulator (3) to between 165 and 185 psi (TM-20).	. . .	. . .
3.	Put accumulator (3) in container (4).	. . .	. . .
4.	Pour hydraulic fluid into container (4) until fluid completely covers accumulator (3).	. . .	. . .
	NOTE Bubbles coming out of accumulator indicate leakage.		
5.	Using watch, check accumulator (3) for leaks for ten minutes:		
	a. At gas valve (2)	No bubbles coming from gas valve (2)	Bad preformed packing or bad valve core
	b. At gas-end cap (5) and fluid-end cap (6)	No bubbles coming from gas-end cap (5) or fluid-end cap (6)	Bad preformed packing or bad rings
6.	Remove accumulator (3) from container (4). Using lint-free cloths, wipe fluid from accumulator.	. . .	. . .
	GO TO FRAME 8		



16-3. MAIN ACCUMULATOR TEST PROCEDURE (CONT)

FRAME 8

Step	Procedure
	WARNING Nitrogen under pressure can hurt you. Keep fingers and hands clear of valve while letting out nitrogen. Let nitrogen out slowly.
1.	Using punch, push in valve core (1) until no more nitrogen comes out of gas valve (2).
2.	Using wrench, install valve cap (3) on gas valve (2).
	NOTE If normal indication is obtained in frames 4, 7, and 8, main accumulator is good.
	END OF TASK



16-4. MAIN ACCUMULATOR DISASSEMBLY PROCEDURE

TOOLS: Vise with brass caps
Spanner wrench, NSN 5120-00-902-5536
End cap removal tool (fabricated tool, item 2, App. B)
Scraper
Stiff bristled brush
Fine stone
O-ring extractor kit

SUPPLIES: Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)
Soft wood block (2"x4"x3')

PERSONNEL: One

REFERENCES: JPG for procedures to:
Clean parts
Inspect and repair parts
Use spanner wrench
Remove preformed packing
TM 9-2350-257-20-2-3 for procedure to remove main accumulator

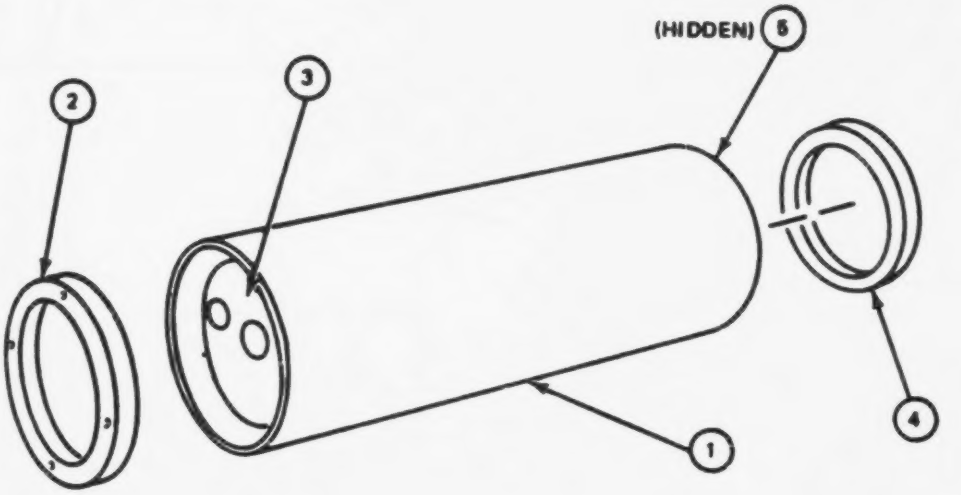
EQUIPMENT CONDITION: Main accumulator removed (TM-20-2-3)

PRELIMINARY PROCEDURES: Test main accumulator (para 16-3)
Remove and disassemble accumulator air valve (para 16-7)

16-4. MAIN ACCUMULATOR DISASSEMBLY PROCEDURE (CONT)

FRAME 1

Step	Procedure
1.	Put accumulator cylinder (1) in vise.
2.	Using spanner wrench, unscrew retaining ring (2) from fluid-end (3) of accumulator cylinder (1) (JPG).
3.	Using spanner wrench, unscrew retaining ring (4) from gas-end (5) of accumulator cylinder (1) (JPG).
	GO TO FRAME 2



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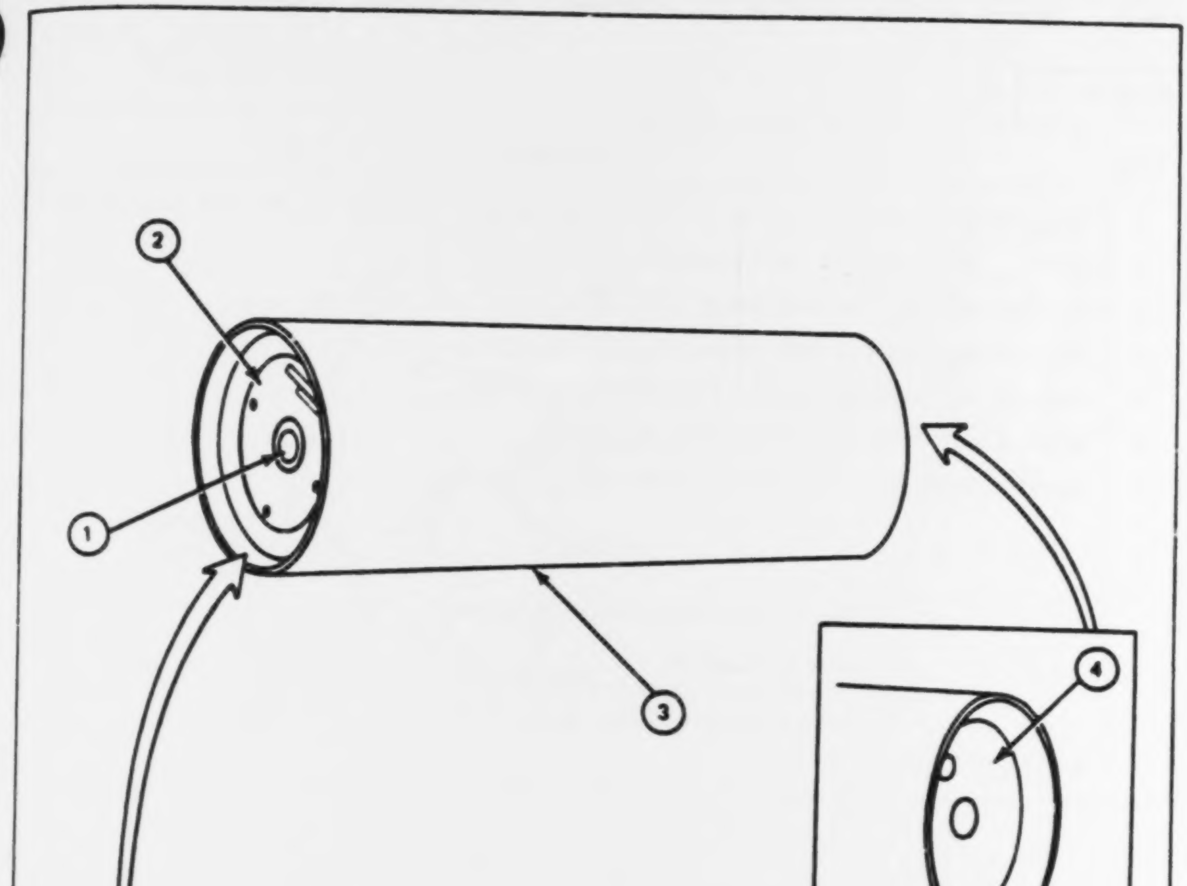
16-4. MAIN ACCUMULATOR DISASSEMBLY PROCEDURE (CONT)

FRAME 2

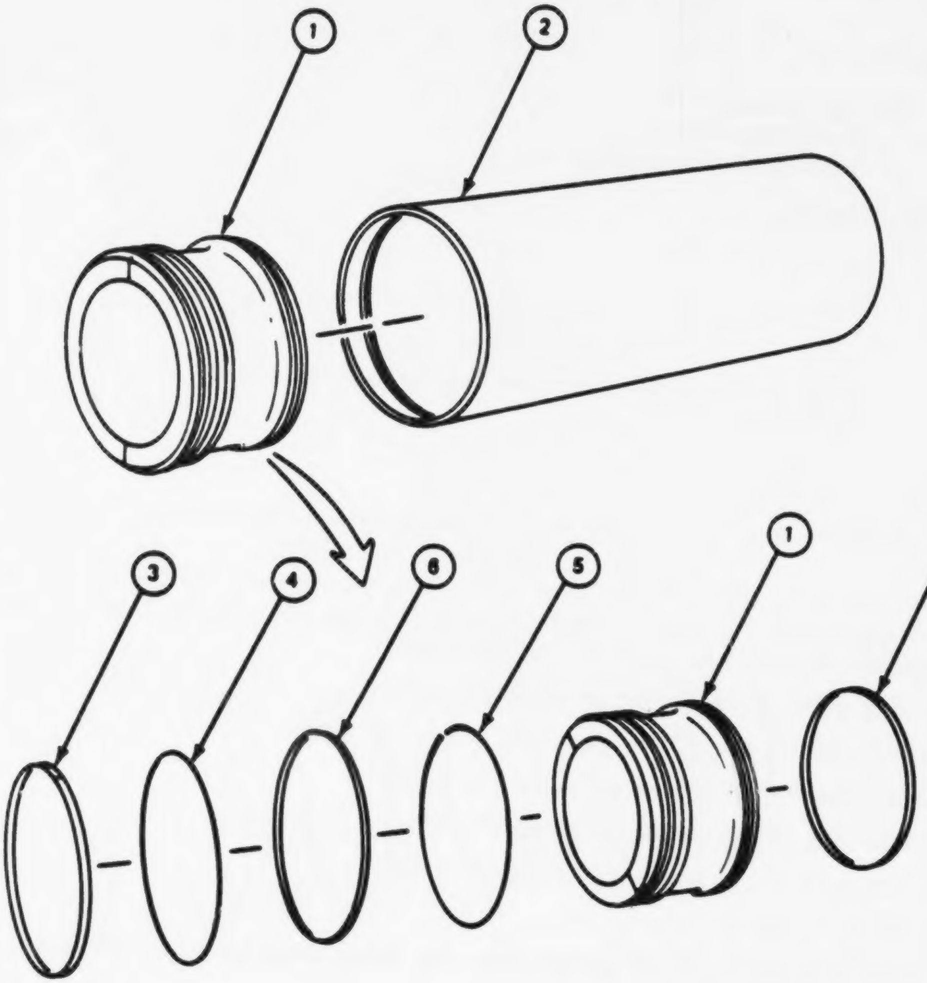
Step	Procedure
1.	Using end-cap removal tool, screw tool three turns into air valve (1) hole of gas-end cap (2).
2.	Pull on end-cap removal tool and remove gas-end cap (2) from accumulator cylinder (3).
	NOTE If step 3 cannot be done, go to step 4.
3.	Using hands, remove fluid-end (bottom) cap (4) from accumulator cylinder (3).
4.	Using soft wood block, push or lightly tap out fluid-end cap (4) from other end of accumulator cylinder (3).
5.	Using O-ring extractor tool, remove preformed packing (5) and backup ring (6) from fluid-end cap (4) (JPG).
6.	Using O-ring extractor tool, remove preformed packing (7) and backup ring (8) from gas-end cap (2) (JPG).
	GO TO FRAME 3



16-4. MAIN ACCUMULATOR DISASSEMBLY PROCEDURE (CONT)

FRAME 3

Step	Procedure
1.	Using wood block, push piston (1) out of accumulator cylinder (2). Do not drop piston.
2.	Remove ring guide (3) from piston (1) (JPG).
3.	Remove seal ring (4) from piston (1) (JPG).
4.	Remove seal ring (5) from piston (1) (JPG).
5.	Remove seal packing ring (6) from piston (1) (JPG).
6.	Remove ring guide (7) from piston (1) (JPG).
7.	Remove accumulator cylinder (2) from vise.
	NOTE
	Follow-on Maintenance Action Required:
	Clean all parts (JPG). Inspect and repair all parts (JPG). Do detail inspection of parts (para 16-2).
	END OF TASK



16-5. MAIN ACCUMULATOR ASSEMBLY PROCEDURE

TOOLS: Vise with brass caps
Spanner wrench, NSN 5120-00-902-5536

SUPPLIES: Soft wood block (2"x4"x3')
Parts kit (5703042)
Preformed packing (MS 28778-5)
Hydraulic fluid (item 10, App. A)

PERSONNEL: One

REFERENCES: JPG for procedures to:
Use spanner wrench
Install preformed packing

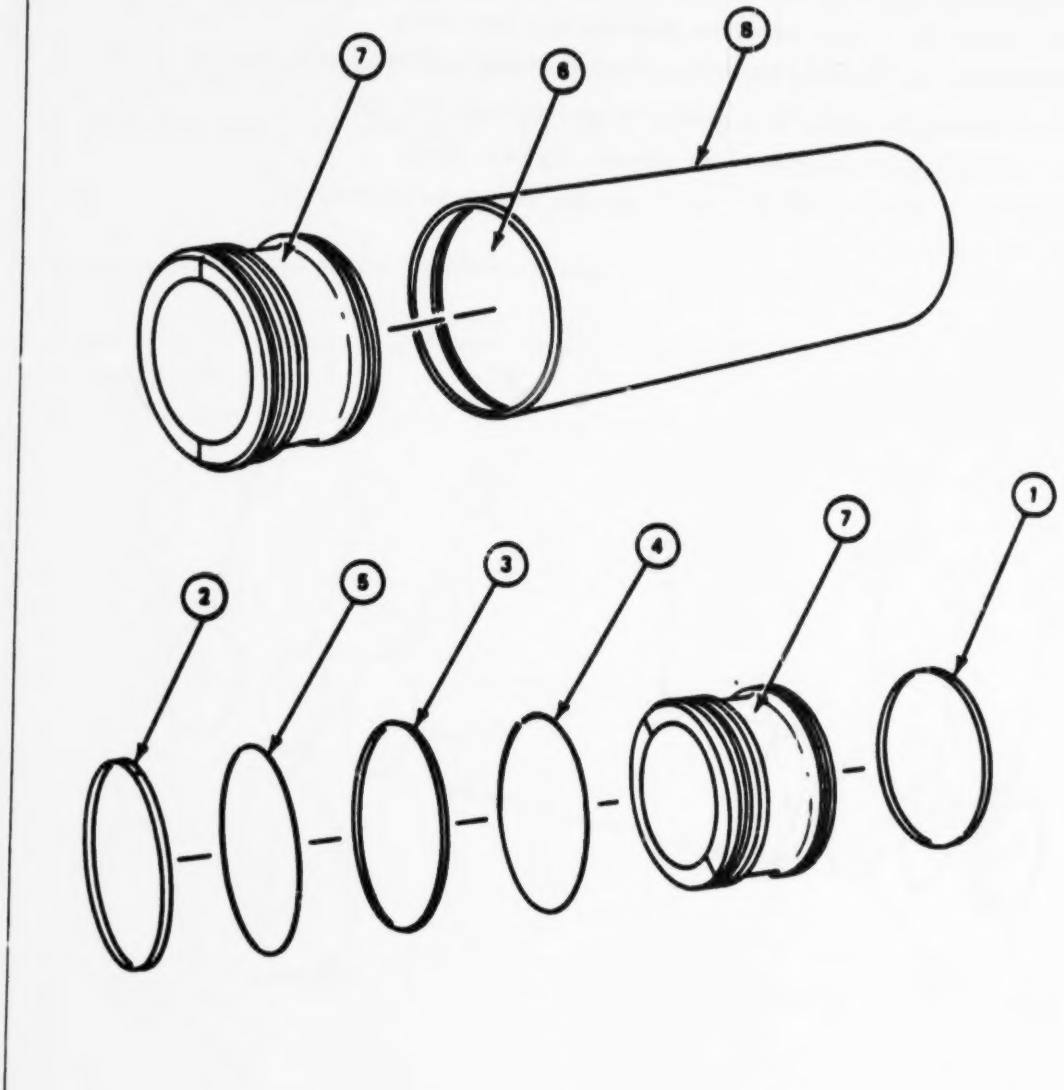
GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in tubing or parts. Dirt can damage equipment.

FRAME 1

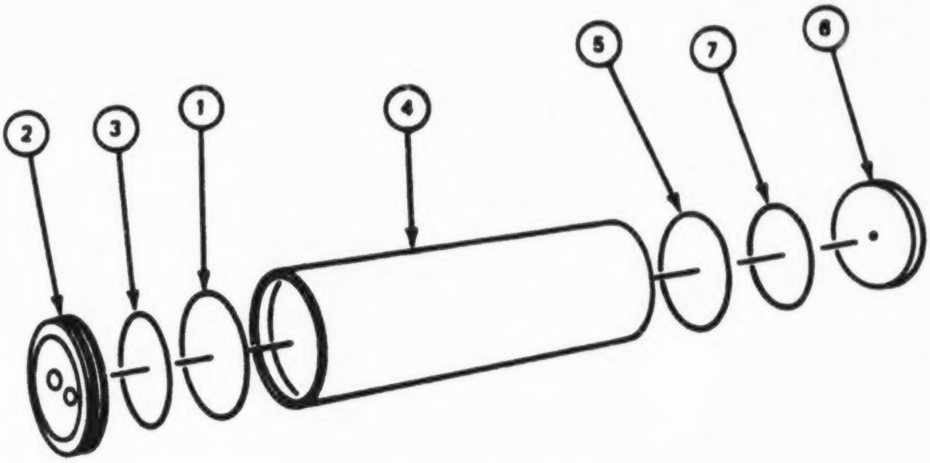
Step	Procedure
1.	Coat new ring guides (1) and (2), seal rings (3), (4), and (5), cylinder bore (6) and machined surfaces of piston (7) with hydraulic fluid.
2.	Put new ring guide (1) in groove of piston (7) (JPG).
3.	Put new seal packing ring (3) in groove on piston (7) (JPG).
4.	Put new seal ring (4) in groove on piston (7) (JPG).
5.	Put new seal ring (5) in groove on piston (7) (JPG).
6.	Put new ring guide (2) in groove on piston (7) (JPG).
7.	Put cylinder (8) in vise.
8.	Using hands, start piston (7) in cylinder bore (6). Using wood block, tap piston (7) in cylinder bore (6).
9.	Using hands, push piston (7) in, at least 3 inches, from either end of cylinder (8).
	GO TO FRAME 2



16-5. MAIN ACCUMULATOR ASSEMBLY PROCEDURE (CONT)

FRAME 2

Step	Procedure
1.	Put preformed packing (1) in groove on fluid-end cap (2) (JPG).
2.	Put backup ring (3) in groove on fluid-end cap (2) (JPG).
3.	Using hand, put fluid-end cap (2) in hydraulic fluid end of accumulator (4).
4.	Put preformed packing (5) in groove on gas-end cap (6) (JPG).
5.	Put backup ring (7) in groove on gas-end cap (6) (JPG).
6.	Using hands, put gas-end cap (6) in nitrogen end of accumulator (4).
	GO TO FRAME 3



16-5. MAIN ACCUMULATOR ASSEMBLY PROCEDURE (CONT)

FRAME 3

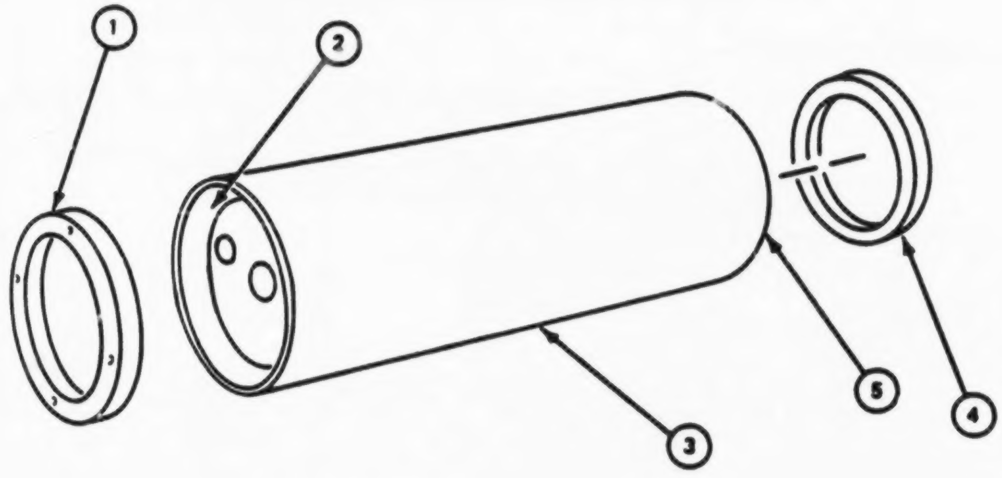
Step	Procedure
1.	Using spanner wrench, screw retaining ring (1) on fluid-end (bottom) (2) of accumulator cylinder (3) (JPG).
2.	Using spanner wrench, screw retaining ring (4) on gas-end (top) (5) of accumulator cylinder (3) (JPG).
3.	Remove accumulator cylinder (3) from vise.

NOTE

Follow-on Maintenance Action Required:

Test main accumulator (para 16-3).
Assemble and install air valve (para 16-8).

END OF TASK



16-6. AIR VALVE TEST PROCEDURE

TOOLS: 3/8" combination wrench
Paint brush
Flashlight
Inspection mirror

SUPPLIES: Soap solution

PERSONNEL: One

REFERENCES: JPG for procedures to check for gas leaks
TM 9-2350-257-20-2-3 for procedures to:
Lower hydraulic system pressure
Check main accumulator nitrogen pressure
Charge main accumulator

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Turret Traverse Lock	FO-4	6
Main Accumulator	FO-1	19
Gunner's Control Box	FO-1	2
Pressure Gauge	FO-1	25
Driver's Master Control Panel	FO-4	10

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
Gunner's control box ELEV/TRAV POWER switch set to OFF
Turret traverse lock set to LOCKED

GENERAL INSTRUCTIONS:

NOTE

If normal indication is not obtained, disassemble air valve (para 16-7) and replace bad part listed in Probable Fault column.

16-6. AIR VALVE TEST PROCEDURE (CONT)

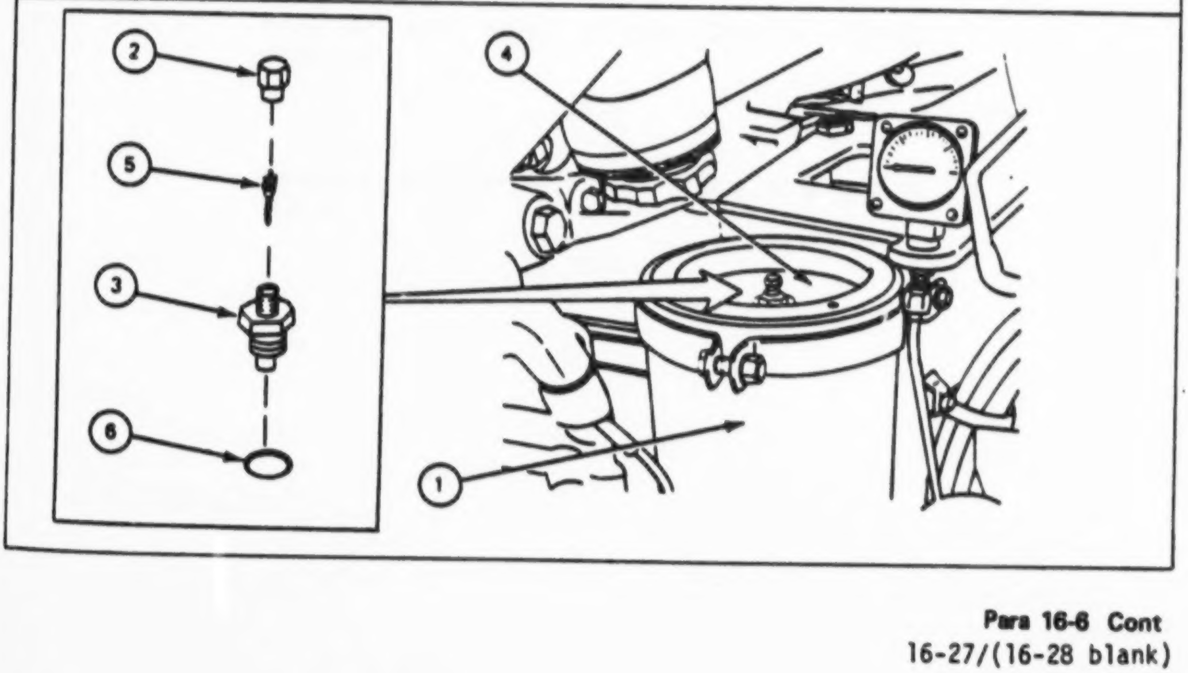
FRAME 1

Step	Procedure	Normal Indication	Probable Fault
1.	Check nitrogen pressure in main accumulator (1) (TM-20-2-3).	. . .	. . .
2.	Using wrench, remove valve cap (2) from gas valve (3) on gas-end cap (4).	. . .	. . .
3.	Using paint brush, put soap solution around gas valve (3) and valve core (5) (JPG).	. . .	. . .
4.	Using flashlight and mirror, check gas valve (3) and valve core (5) for leaks (JPG).	No bubbles at:	
		a. gas valve (3)	Bad packing (6)
		b. valve core (5)	Bad valve core (5)

NOTE

If normal indication was obtained in step 4, part is good.

Step	Procedure
5.	Using wrench, install valve cap (2) on gas valve (3).
	END OF TASK



16-7. AIR VALVE REMOVAL AND DISASSEMBLY PROCEDURE

TOOLS: Valve core tool
3/4" socket (1/2" drive)
1/2" drive ratchet
3/8" combination wrench
O-ring extractor kit

PERSONNEL: One

REFERENCES: TM 9-2350-257-20-2-3 for procedure to:
Lower hydraulic system pressure
JPG for procedures to:
Remove preformed packings
Use valve core tool

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Main Accumulator	FO-1	19
Gunner's Control Box	FO-1	2
Driver's Master Control Panel	FO-4	10
Turret Traverse Lock	FO-4	6

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
Gunner's control box ELEV/TRAV POWER switch set to OFF
Turret traverse lock set to LOCKED

GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in parts. Dirt can damage equipment.

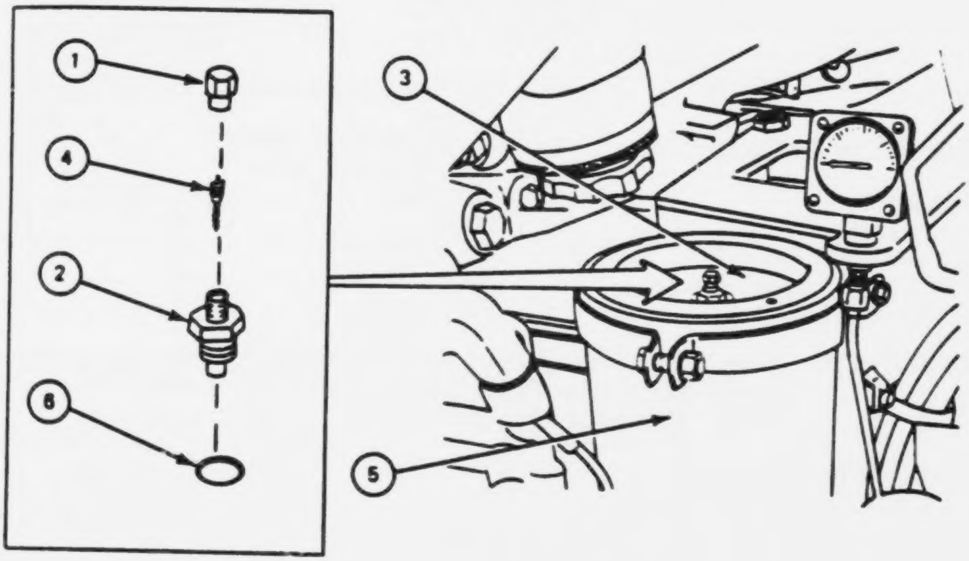
NOTE

Equipment conditions apply only if task is being done on vehicle.

16-7. AIR VALVE REMOVAL AND DISASSEMBLY PROCEDURE (CONT)

FRAME 1

Step	Procedure
	WARNING Before removing air valve (2), hydraulic system pressure must be lowered to 0 psi. Hydraulic system under pressure can hurt you.
1.	Lower hydraulic system pressure to 0 psi (TM-20-2-3).
2.	Using 3/8" wrench, remove valve cap (1) from air valve (2) in gas-end cap (3).
	CAUTION Lower nitrogen pressure slowly to keep valve core (4) from freezing.
3.	Using valve core tool, lower accumulator (5) nitrogen pressure to 0 psi by pushing down on valve core (4) pin (JPG).
4.	Using valve core tool, remove valve core (4) (JPG).
5.	Using socket wrench, remove air valve (2) and packing (6) from gas-end cap (3) of accumulator (5).
6.	Using O-ring extractor tool, remove preformed packing (6) from air valve (2) (JPG).
	END OF TASK



16-8. AIR VALVE ASSEMBLY AND INSTALLATION PROCEDURE

TOOLS: 3/4" socket (1/2" drive)
1/2" drive ratchet
3/8" combination wrench
Valve core tool
O-ring extractor kit

SUPPLIES: Preformed packing (MS 28778-5)

PERSONNEL: One

REFERENCES: TM 9-2350-257-20-2-3 for procedure to charge main accumulator
JPG for procedures to:
Install preformed packing
Use valve core tool

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Main Accumulator	FO-1	19
Gunner's Control Box	FO-1	2
Driver's Master Control Panel	FO-4	10
Turret Traverse Lock	FO-4	6

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
Gunner's control box ELEV/TRAV POWER switch set to OFF
Turret traverse lock set to LOCKED

GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in parts. Dirt can damage equipment.

NOTE

Equipment conditions and follow-on maintenance apply only if task is being done on vehicle.

16-8. AIR VALVE ASSEMBLY AND INSTALLATION PROCEDURE (CONT)

FRAME 1

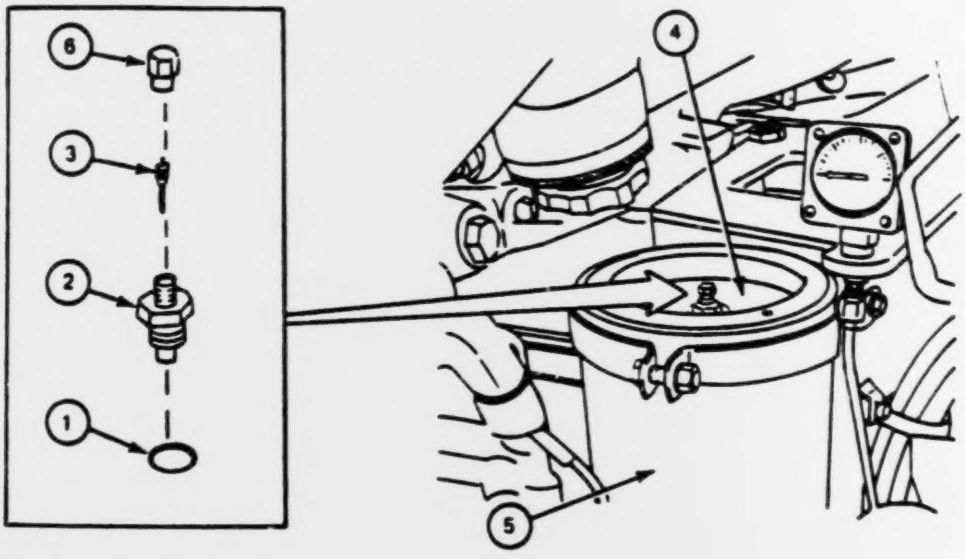
Step	Procedure
1.	Using O-ring extractor tool, put new preformed packing (1) on air valve (2) (JPG).
2.	Using valve core tool, put valve core (3) in air valve (2) (JPG).
3.	Using socket wrench, put air valve (2) in gas-end cap (top) (4) of main accumulator (5).
4.	Using 3/8" wrench, put valve cap (6) on air valve (2).

NOTE

Follow-on Maintenance Required:

Charge main accumulator (TM-20-2-3).
Test air valve (para 16-6).

END OF TASK



CHAPTER 17

SUPERELEVATION ACTUATOR

17-1. MAINTENANCE PROCEDURES INDEX

Equipment Item	Test	Tasks Disassembly	Assembly
Superelevation Actuator	17-2	17-3	17-4

17-2. SUPERELEVATION ACTUATOR TEST PROCEDURE

TEST EQUIPMENT:
- M3 oil pump
- Pressure gauge (0 to 2000 psi)
- Dial indicator
- Suitable fittings, lines, packings and tools
- Shut-off valve (two)
- Elevating mechanism (without stabilization)

TOOLS:
- 1/4" drive torque wrench (0 to 50 inch-ounces)
- 1/8" hex head socket (1/4" drive)

SUPPLIES:
- Rags (item 21, App. A)
- Pans (two)
- Hydraulic fluid (item 10, App. A)

REFERENCES:
- TM 9-2350-257-20-2-3 for procedure to remove superelevation actuator
- JPG for procedure to use M3 oil pump

EQUIPMENT CONDITION: Superelevation actuator removed (TM-20-2-3)

PRELIMINARY PROCEDURES: Assemble superelevation actuator (para 17-4)

GENERAL INSTRUCTIONS:

WARNING

Hydraulic fluid under pressure can hurt or kill you. This test is done with high pressure hydraulic fluid. Follow procedure carefully.

NOTE

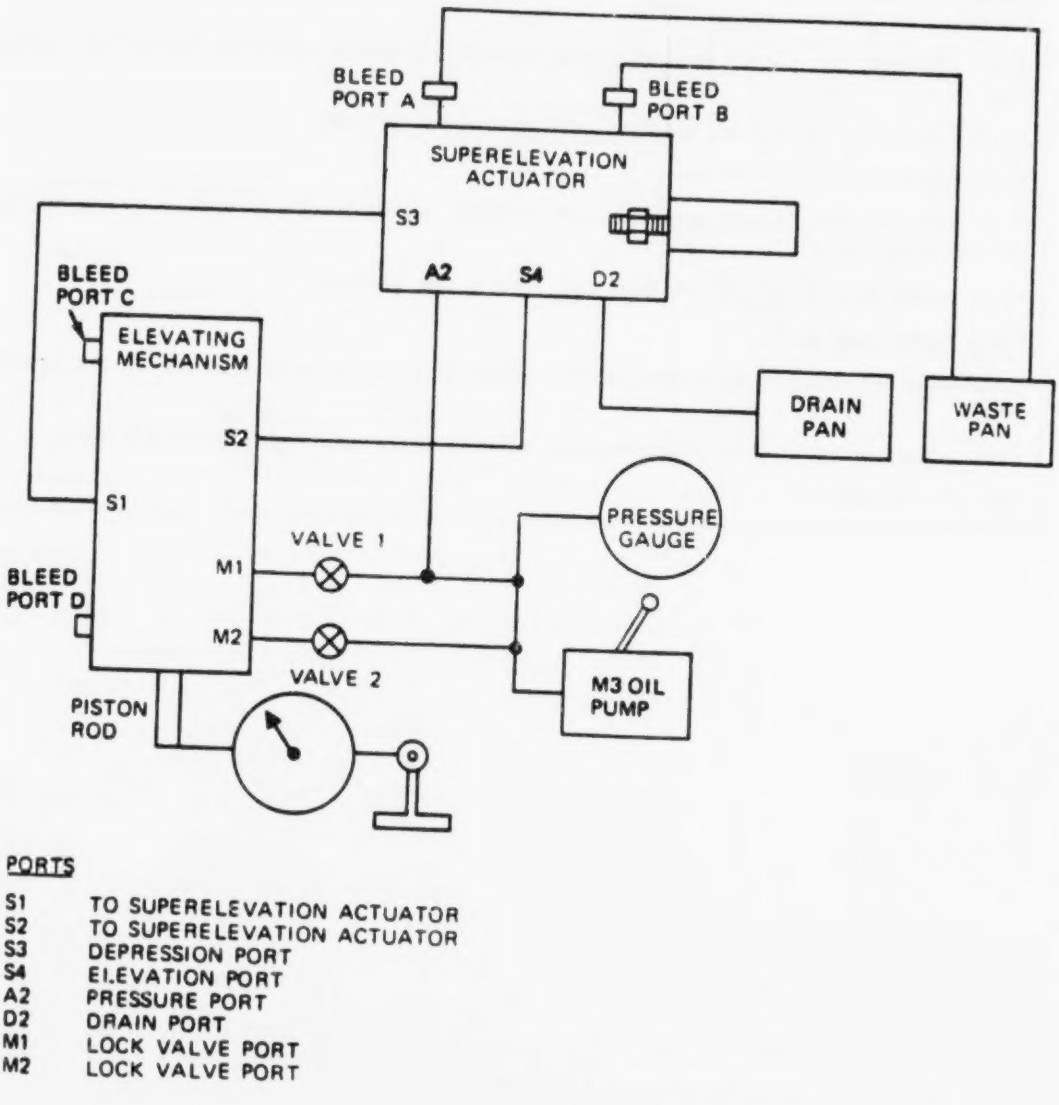
Suitable fittings, lines, packings, and tools should be used to connect test equipment to parts being tested.

If normal indication is not obtained, superelevation actuator is bad. Disassemble bad superelevation actuator (para 17-3).

17-2. SUPERELEVATION ACTUATOR TEST PROCEDURE (CONT)

FRAME 1

Step	Procedure
1.	Connect superelevation actuator to test equipment as shown.
2.	Block all ports not used in test setup with caps or plugs.
3.	Close bleed ports A, B, C, and D.
4.	Close (clockwise) valves 1 and 2.
	NOTE
	Do steps 6 through 8 to move elevating mechanism piston rod out. Do steps 9 through 11 to move elevating mechanism piston rod in. Go to FRAME 2 if elevating mechanism piston rod is in mid-position.
5.	Check to make sure elevating mechanism piston rod is in mid-position.
6.	Open valve 1 and carefully open bleed port D.
7.	Using M3 oil pump, put oil in elevating mechanism until oil flows from bleed port D and elevating mechanism rod moves to mid-position (JPG).
8.	Close bleed port D and valve 1.
9.	Open valve 2 and carefully open bleed port C.
10.	Using M3 oil pump, put oil in elevating mechanism until oil flows from bleed port C and elevating mechanism piston rod moves to mid position (JPG).
11.	Close bleed port C and valve 2.
	GO TO FRAME 2


BLEED PORT A
BLEED PORT B
SUPERELEVATION ACTUATOR
S3
A2
S4
D2
BLEED PORT C
ELEVATING MECHANISM
S2
S1
DRAIN PAN
WASTE PAN
PRESSURE GAUGE
VALVE 1
M1
BLEED PORT D
M2
VALVE 2
M3 OIL PUMP
PISTON ROD

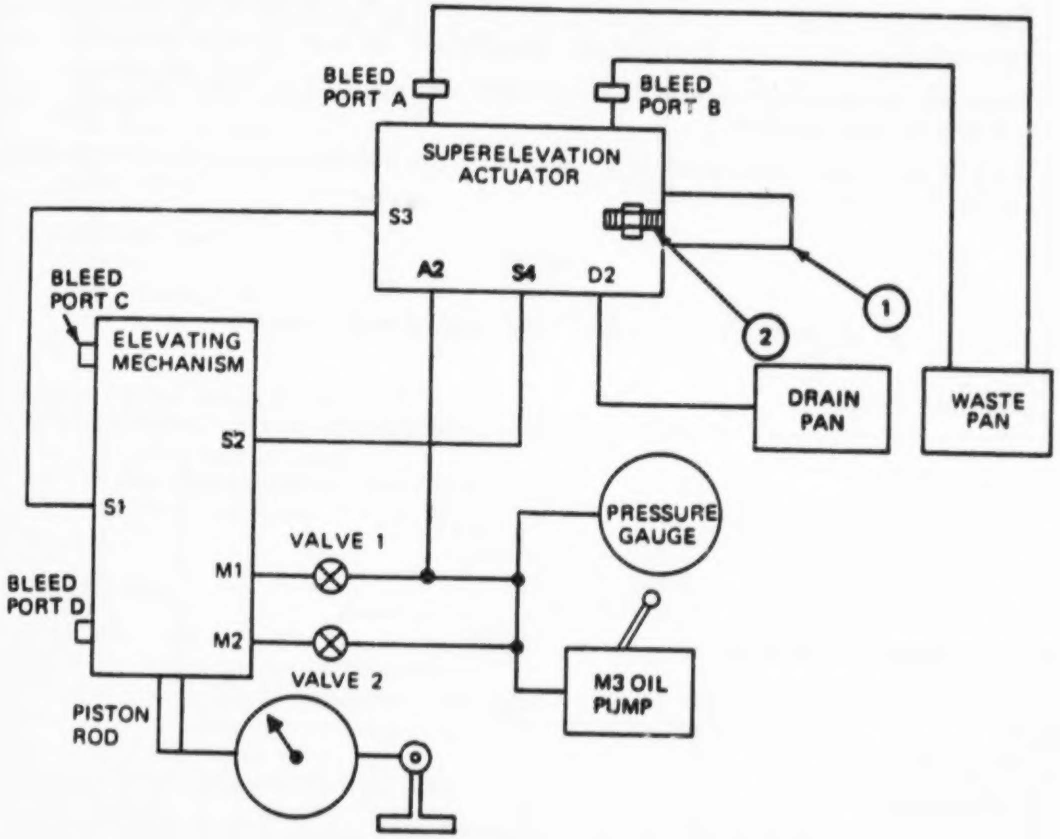
PORTS

S1	TO SUPERELEVATION ACTUATOR
S2	TO SUPERELEVATION ACTUATOR
S3	DEPRESSION PORT
S4	ELEVATION PORT
A2	PRESSURE PORT
D2	DRAIN PORT
M1	LOCK VALVE PORT
M2	LOCK VALVE PORT

17-2. SUPERELEVATION ACTUATOR TEST PROCEDURE (CONT)

FRAME 2

Step	Procedure
1.	Using M3 oil pump, pressurize test system and maintain between 900 and 950 psi as indicated on pressure gauge (JPG).
2.	Turn adjusting nut (1) on superelevation actuator clockwise until it is felt to run against stop.
3.	Open bleed port A and let oil flow until free of air bubbles.
4.	Close bleed port A.
5.	Turn adjusting nut (1) on superelevation actuator counterclockwise until it is felt to run off adjusting screw (2).
6.	Open bleed port B and let oil flow until free of air bubbles.
7.	Close bleed port B.
8.	Turn adjusting nut (1) on superelevation actuator clockwise until it is felt to run against stop.
9.	Turn adjusting nut (1) on superelevation actuator counterclockwise three full turns.
	GO TO FRAME 3


BLEED PORT A
BLEED PORT B
SUPERELEVATION ACTUATOR
S3
A2
S4
D2
1
2
BLEED PORT C
ELEVATING MECHANISM
S2
DRAIN PAN
WASTE PAN
S1
PRESSURE GAUGE
VALVE 1
M1
BLEED PORT D
M2
VALVE 2
M3 OIL PUMP
PISTON ROD

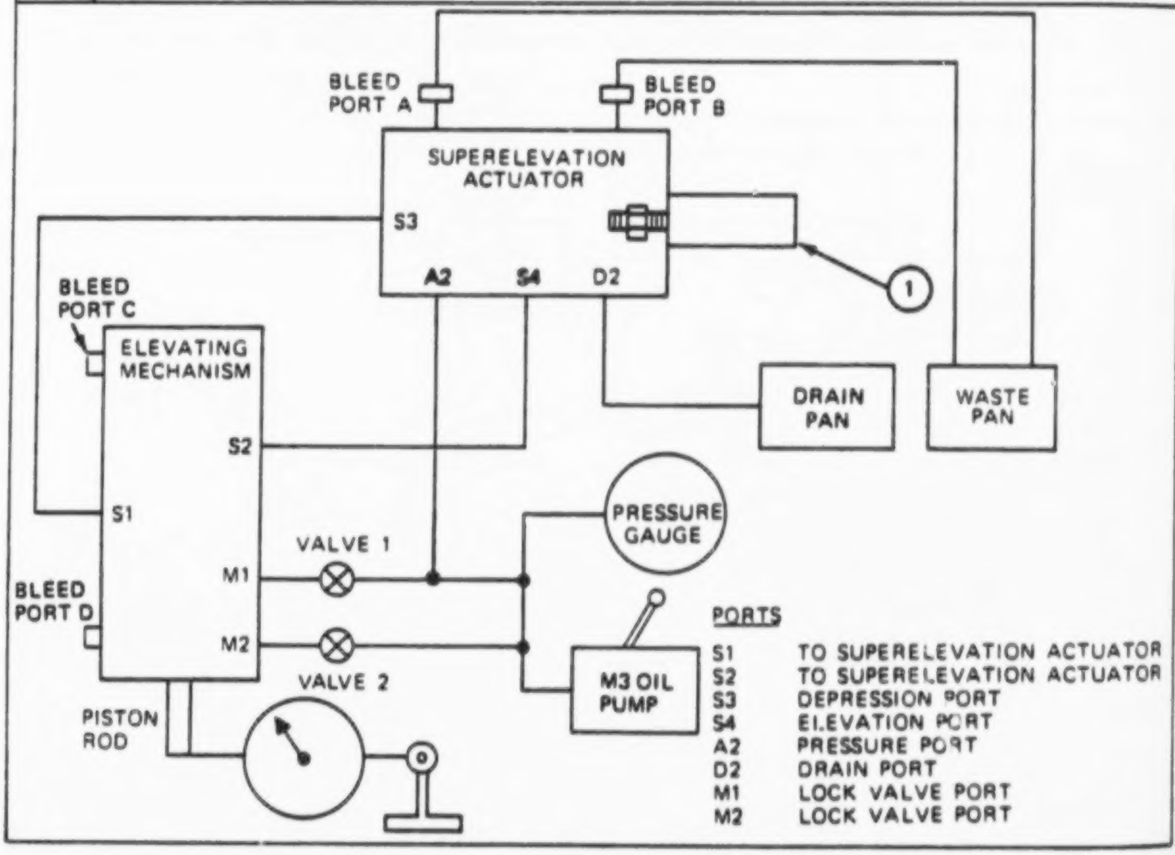
PORTS

S1	TO SUPERELEVATION ACTUATOR
S2	TO SUPERELEVATION ACTUATOR
S3	DEPRESSION PORT
S4	ELEVATION PORT
A2	PRESSURE PORT
D2	DRAIN PORT
M1	LOCK VALVE PORT
M2	LOCK VALVE PORT

17-2. SUPERELEVATION ACTUATOR TEST PROCEDURE (CONT)

FRAME 3

Step	Procedure
1.	Position dial indicator to 0 indication at end of piston rod on elevating mechanism.
2.	Turn adjusting nut (1) of superelevation actuator one full turn in either direction.
3.	Piston rod on elevating mechanism should move between 0.0825" and 0.0975" as indicated on dial indicator.
4.	Using torque wrench and attachment, measure torque at adjusting nut (1). Torque should not be more than 32 inch-ounces.
	NOTE If normal indication is obtained, superelevation actuator is good.
	END OF TASK


BLEED PORT A
BLEED PORT B
SUPERELEVATION ACTUATOR
S3
A2
S4
D2
1
BLEED PORT C
ELEVATING MECHANISM
S2
S1
M1
M2
DRAIN PAN
WASTE PAN
PRESSURE GAUGE
VALVE 1
VALVE 2
BLEED PORT D
M3 OIL PUMP
PISTON ROD

PORTS

S1	TO SUPERELEVATION ACTUATOR
S2	TO SUPERELEVATION ACTUATOR
S3	DEPRESSION PORT
S4	ELEVATION PORT
A2	PRESSURE PORT
D2	DRAIN PORT
M1	LOCK VALVE PORT
M2	LOCK VALVE PORT

17-3. SUPERELEVATION ACTUATOR DISASSEMBLY PROCEDURE

TOOLS: 1/8" socket head screw key (Allen wrench)
7/16" combination wrench
Internal retaining ring pliers
12" adjustable wrench
5/32" socket head screw key (Allen wrench)
1/4" flat tip screwdriver
Slip joint pliers with plastic jaws
O-ring extractor kit
Needle nose pliers
Adjustable hook spanner wrench
Soft faced hammer
20 ounce ball peen hammer
Metal scribe
Vise with brass caps
Pry bars (two)
Scraper
Stiff bristled brush
Fine stone

SUPPLIES: Wood blocks (2" x 2" x 6")
Pencil
Lacing wire, 6" long
Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

PERSONNEL: One

REFERENCES: TM 9-2350-257-20-2-3 for procedure to remove superelevation actuator
JPG for procedures to:
- Remove preformed packings
- Remove retaining rings
- Clean parts
- Inspect and repair parts

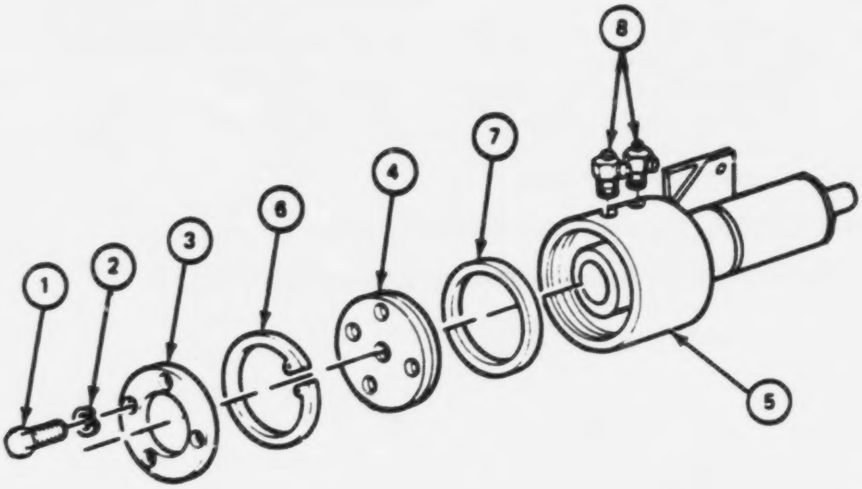
EQUIPMENT CONDITION: Superelevation actuator removed (TM-20-2-3)

PRELIMINARY PROCEDURES: Test superelevation actuator (para 17-2)

17-3. SUPERELEVATION ACTUATOR DISASSEMBLY PROCEDURE (CONT)

FRAME 1

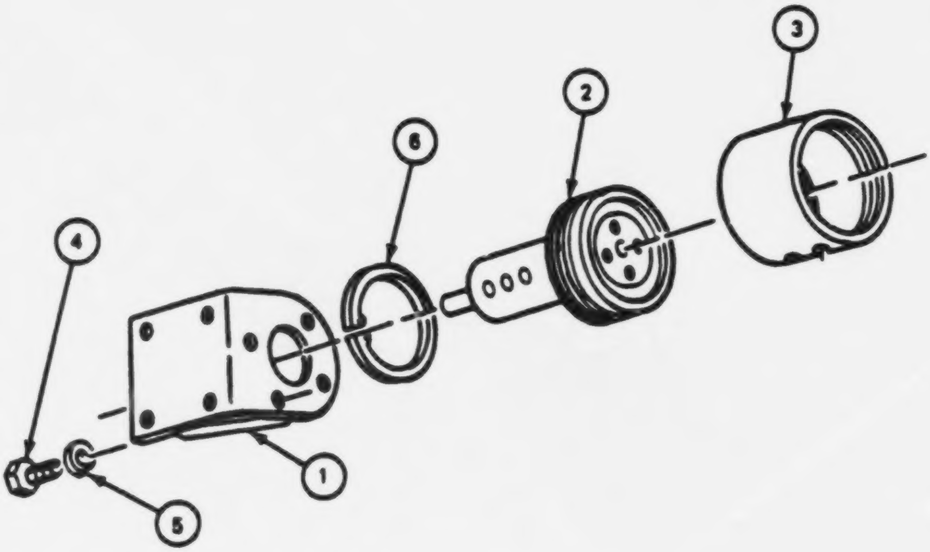
Step	Procedure
1.	Using combination wrench, remove four screws (1) and four lockwashers (2) that attach end plate ring (3) to end plate (4). Remove end plate ring.
2.	Put housing (5) in vise.
3.	Using retaining ring pliers, remove retaining ring (6) (JPG).
4.	Put two screws (1) in opposite holes of end plate (4) finger tight.
5.	Using two pry bars under screw (1) heads, pry end plate (4) from housing (5).
6.	Using O-ring extractor tool, remove preformed packing (7) from end plate (4) (JPG). Throw preformed packing away.
7.	Using adjustable wrench, remove two drain cocks (8) from housing (5).
	GO TO FRAME 2



17-3. SUPERELEVATION ACTUATOR DISASSEMBLY PROCEDURE (CONT)

FRAME 2

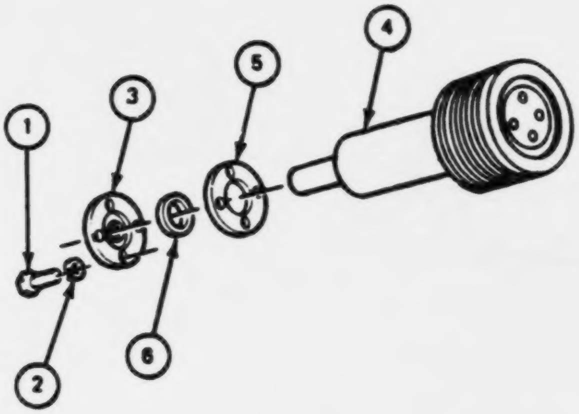
Step	Procedure
1.	Using scribe, make a line across bracket (1), body and piston (2), and housing (3).
2.	Using combination wrench, remove four screws (4) and four lockwashers (5) that attach bracket (1) to body and piston (2). Remove bracket.
3.	Using retaining ring pliers, remove ring (6) from housing (3) (JPG).
4.	Using ball peen hammer and wood block, remove body and piston (2) from housing (3).
5.	Remove housing (3) from vise.
	GO TO FRAME 3



17-3. SUPERELEVATION ACTUATOR DISASSEMBLY PROCEDURE (CONT)

FRAME 3

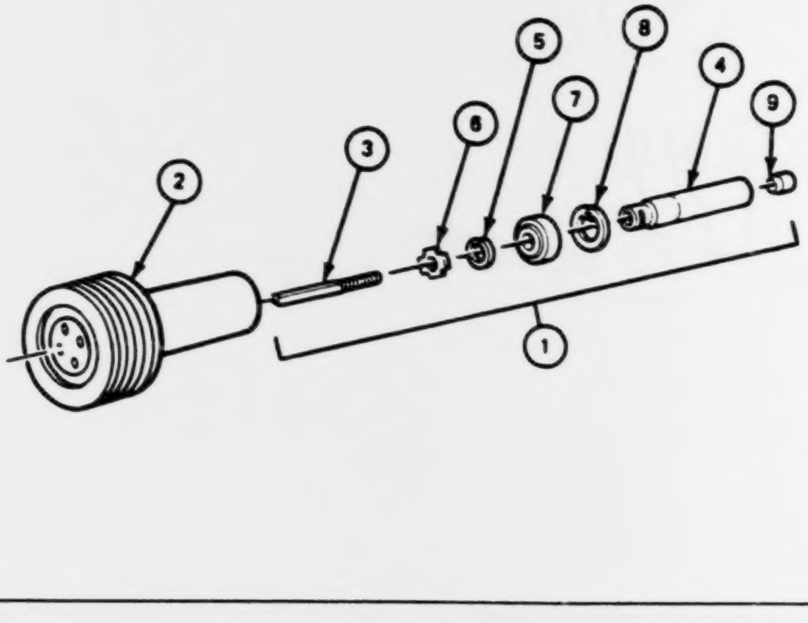
Step	Procedure
	WARNING Cover is under spring tension. Part could fly out and hurt you.
1.	Using screwdriver, remove four screws (1) and four lockwashers (2) that attach cover (3) to body (4).
2.	Remove cover (3) and gasket (5).
3.	Using O-ring extractor tool, remove quad ring (packing) (6) from cover (3) (JPG). Throw quad ring away.
	GO TO FRAME 4



17-3. SUPERELEVATION ACTUATOR DISASSEMBLY PROCEDURE (CONT)

FRAME 4

Step	Procedure
1.	Remove shaft assembly (1) from body and piston (2).
2.	Using 5/32" Allen wrench, remove adjusting screw (3) from adjusting nut (4).
3.	Using screwdriver, bend edges of lockwasher (5) away from grooves in nut (6).
4.	Using spanner wrench and 5/32" Allen wrench, remove nut (6) and lockwasher (5).
5.	Using soft faced hammer, remove bearing (7).
6.	Using retaining ring pliers, remove ring (8) from adjusting nut (4) (JPG).
7.	Put adjusting nut (4) in vise.
8.	Using 5/32" Allen wrench, remove plug (9) from adjusting nut (4).
9.	Remove adjusting nut (4) from vise.
	GO TO FRAME 5



17-3. SUPERELEVATION ACTUATOR DISASSEMBLY PROCEDURE (CONT)

FRAME 5

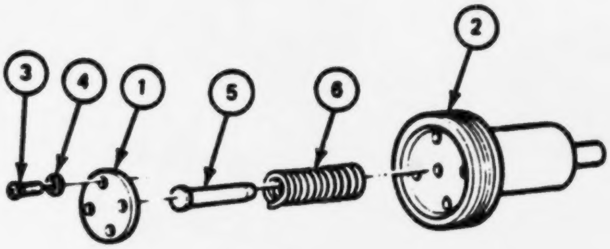
WARNING

Be careful when removing retainer (1) from piston (2). Spring-loaded parts could fly out of piston and hit you.

NOTE

One hand should be used to hold retainer on piston, while removing screws with other hand.

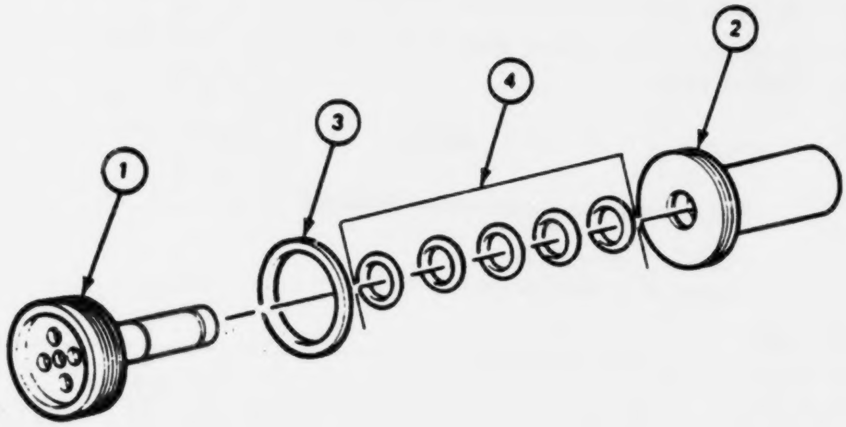
Step	Procedure
1.	Using 1/8" Allen wrench, remove four screws (3), and four lockwashers (4) that attach retainer (1) to piston (2). Remove retainer.
2.	Remove guide pin (5) and spring (6).
	GO TO FRAME 6



17-3. SUPERELEVATION ACTUATOR DISASSEMBLY PROCEDURE (CONT)

FRAME 6

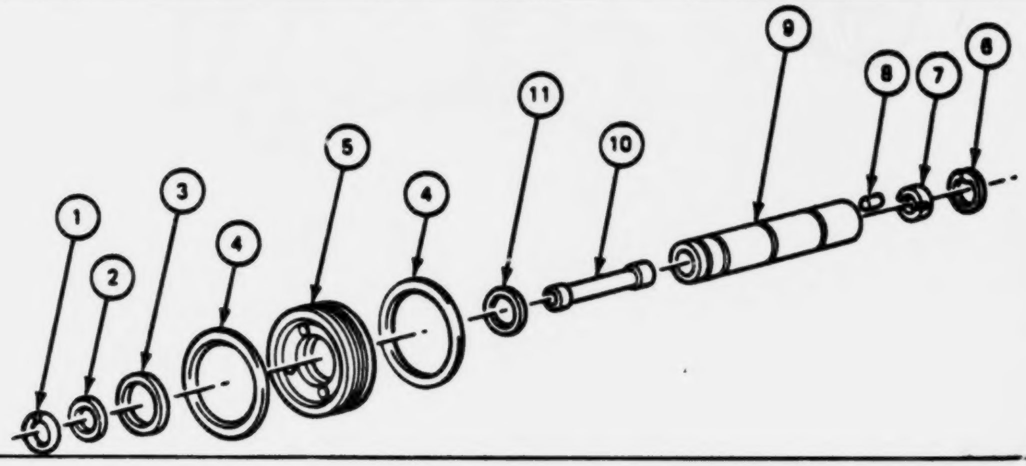
Step	Procedure
1.	Remove piston and sleeve (1) from body (2).
2.	Using O-ring extractor tool, remove preformed packing (3) and five preformed packings (4) from body (2) (JPG). Throw preformed packings away. GO TO FRAME 7



17-3. SUPERELEVATION ACTUATOR DISASSEMBLY PROCEDURE (CONT)

FRAME 7

Step	Procedure
1.	Using retaining ring pliers, remove ring (1) (JPG).
	NOTE Keep shims (2) for assembly (para 17-4).
2.	Using O-ring extractor tool, remove shims (2).
3.	Using O-ring extractor tool, remove preformed packing (3) and two preformed packings (4) from piston (5) (JPG). Throw preformed packings away.
4.	Using retaining ring pliers, remove ring (6) (JPG).
5.	Using lacing wire, remove collar (7).
6.	Using long nose pliers, remove drive pin (8).
7.	Remove sleeve (9) and spool (10) from piston (5).
8.	Using end of pencil, push spool (10) out of sleeve (9).
9.	Using O-ring extractor tool, remove preformed packing (11) from sleeve (9) (JPG). Throw preformed packing away.
	NOTE Follow-on Maintenance Action Required: Clean all parts (JPG). Inspect and repair all parts (JPG).
	END OF TASK



17-4. SUPERELEVATION ACTUATOR ASSEMBLY PROCEDURE

TOOLS: Adjustable hook spanner wrench
7/16" combination wrench
Needle nose pliers
Internal retaining ring pliers
5/32" socket head screw key (Allen wrench)
1/4" flat tip screwdriver
1/8" socket head screw key (Allen wrench)
O-ring extractor kit
12" adjustable wrench
Soft faced hammer
Vise with brass caps

SUPPLIES: Hydraulic fluid (item 10, App. A)
Parts kit (5703503)

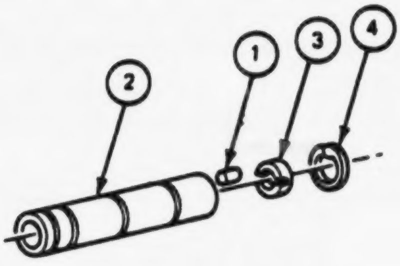
PERSONNEL: One

REFERENCES: JPG for procedures to:
Install preformed packings
Install retaining rings

17-4. SUPERELEVATION ACTUATOR ASSEMBLY PROCEDURE (CONT)

FRAME 1

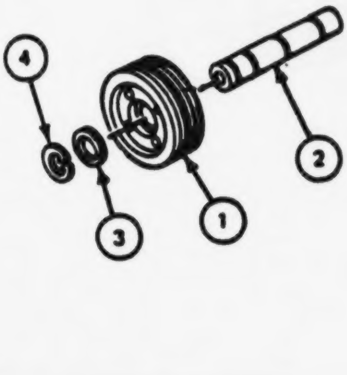
Step	Procedure
1.	Using needle nose pliers, put drive pin (1) in sleeve (2).
2.	Line up groove in collar (3) with pin (1).
3.	Put collar (3) in sleeve (2).
4.	Using retaining ring pliers, put ring (4) on sleeve (2) (JPG).
	GO TO FRAME 2

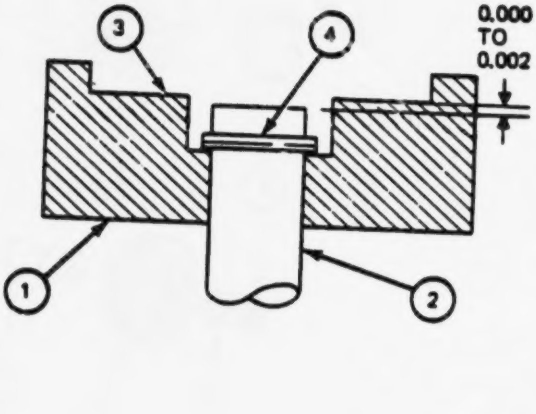


17-4. SUPERELEVATION ACTUATOR ASSEMBLY PROCEDURE (CONT)

FRAME 2

Step	Procedure
1.	Put piston (1) on sleeve (2). **NOTE** Number of shims (3) required depends on results of step 4. Use same number of shims from disassembly for first check (para 17-3).
2.	Put shims (3) on sleeve (2).
3.	Using retaining ring pliers, put ring (4) on sleeve (2) (JPG). SUPPORT SHOP WORK
4.	Take piston (1) and sleeve (2) to shop where dial indicator is available. a. Make dimensional check of distance between end of piston (1) and sleeve (2). b. Add or remove shims (3) so that sleeve (2) will not stick out from piston (1) and end play will not be more than 0.002".
5.	After support shop work, return piston (1) and sleeve (2) to turret shop. GO TO FRAME 3

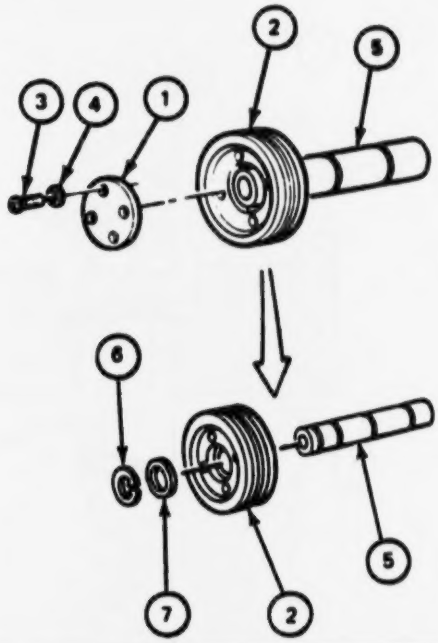




17-4. SUPERELEVATION ACTUATOR ASSEMBLY PROCEDURE (CONT)

FRAME 3

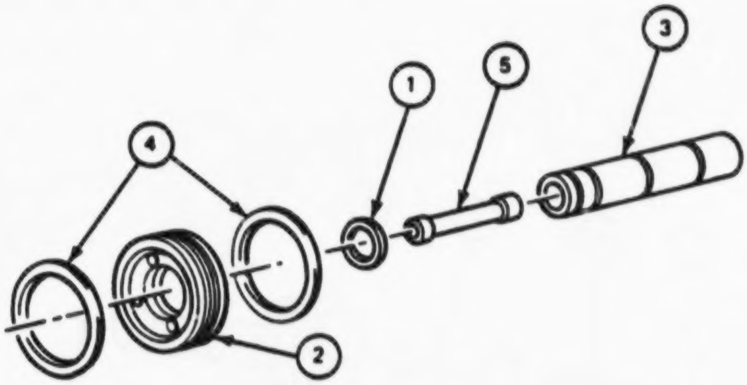
Step	Procedure
1.	Put retainer (1) on piston (2).
2.	Using 1/8" Allen wrench, attach retainer (1) to piston (2) with four screws (3) and four lockwashers (4).
	NOTE Sleeve (5) should be moved in and out with fingers to check end play.
3.	Check end play between sleeve (5) and retainer (1). Shimming is correct when there is no end play.
4.	Using 1/8" Allen wrench, remove four screws (3), and four lockwashers (4) that attach retainer (1) to piston (2). Remove retainer.
5.	Using retaining ring pliers, remove retaining ring (6).
6.	Using O-ring extractor tool, remove shims (7).
7.	Remove piston (2) from sleeve (5).
	GO TO FRAME 4



17-4. SUPERELEVATION ACTUATOR ASSEMBLY PROCEDURE (CONT)

FRAME 4

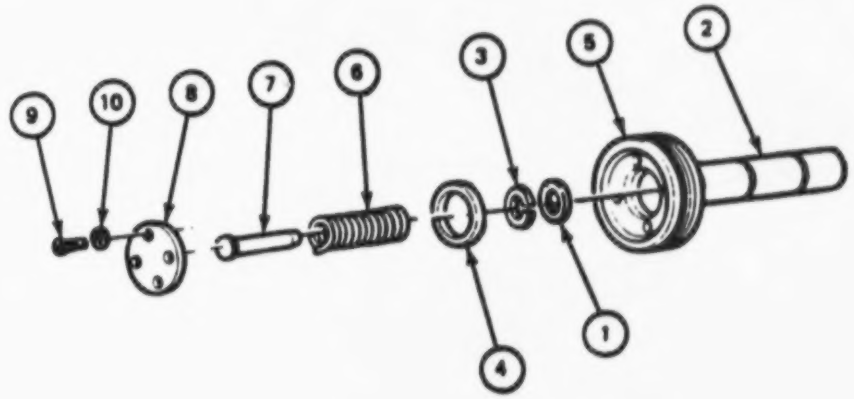
Step	Procedure
1.	Using O-ring extractor tool, put preformed packing (1) in bore of piston (2) (JPG).
2.	Put piston (2) on sleeve (3).
3.	Using O-ring extractor tool, put two preformed packings (4) in grooves of piston (2). Make sure preformed packings are seated well in groove (JPG).
4.	Put spool (5) with small hole end first into sleeve (3).
	GO TO FRAME 5



17-4. SUPERELEVATION ACTUATOR ASSEMBLY PROCEDURE (CONT)

FRAME 5

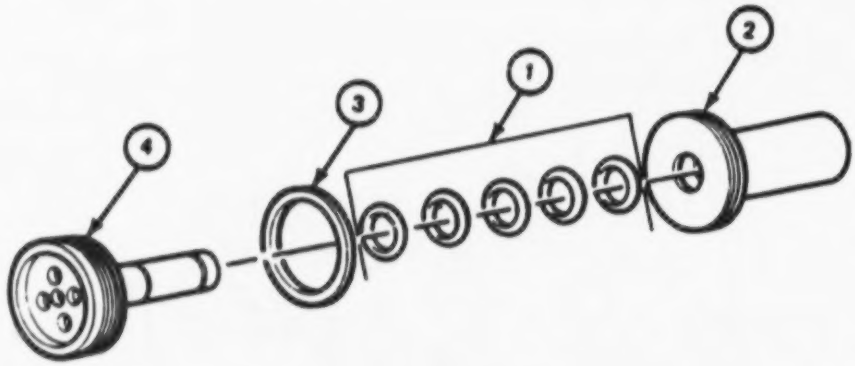
Step	Procedure
1.	Put same shims (1) removed in Frame 3 on sleeve (2)
2.	Using retaining pliers, put retaining ring (3) on sleeve (2) (JPG).
3.	Using O-ring extractor tool, put preformed packing (4) in groove in face of piston (5) (JPG). Make sure preformed packing is seated well in groove.
4.	Put spring (6) and guide pin (7) in bore of spool in sleeve (2).
	WARNING Be careful when putting retainer (8) on piston (2), spring loaded parts could fly out of piston and hit you.
5.	Put retainer (8) on piston (5).
6.	Using 1/8" Allen wrench, attach retainer (8) to piston (5) with four screws (9) and four lockwashers (10).
	GO TO FRAME 6



17-4. SUPERELEVATION ACTUATOR ASSEMBLY PROCEDURE (CONT)

FRAME 6

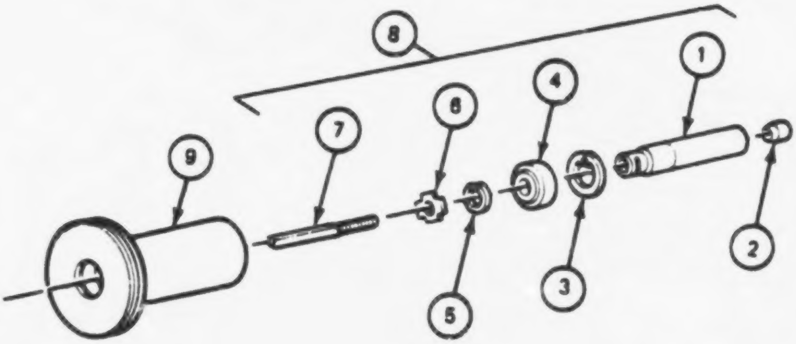
Step	Procedure
1.	Using O-ring extractor tool, put five prepformed packings (1) in body (2) and preformed packing (3) in groove of body (2) (JPG).
2.	Put piston and sleeve (4) in body (2).
	GO TO FRAME 7



17-4. SUPERELEVATION ACTUATOR ASSEMBLY PROCEDURE (CONT)

FRAME 7

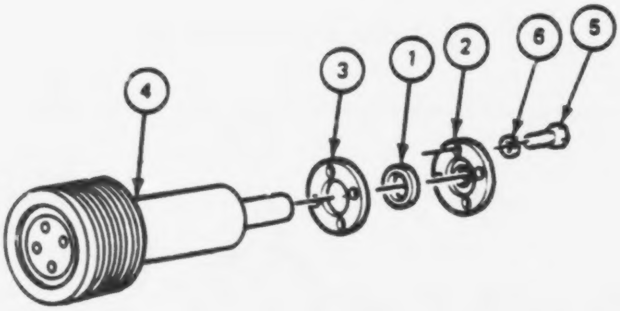
Step	Procedure
1.	Put adjusting nut (1) in vise.
2.	Using 5/32" Allen wrench, put plug (2) in adjusting nut (1).
3.	Remove adjusting nut (1) from vise.
4.	Using retaining ring pliers, put ring (3) on adjusting nut (1) (JPG).
5.	Using soft faced hammer, put bearing (4) on adjusting nut (1).
6.	Place lockwasher (5) on threaded end of adjusting nut (1).
7.	Using spanner wrench and 5/32" Allen wrench, put nut (6) on threaded end of adjusting nut (1).
8.	Using screwdriver, bend lockwasher (5) into grooves of nut (6).
9.	Put adjusting screw (7) in adjusting nut (1).
10.	Put shaft assembly (8) in body (9).
	GO TO FRAME 8



17-4. SUPERELEVATION ACTUATOR ASSEMBLY PROCEDURE (CONT)

FRAME 8

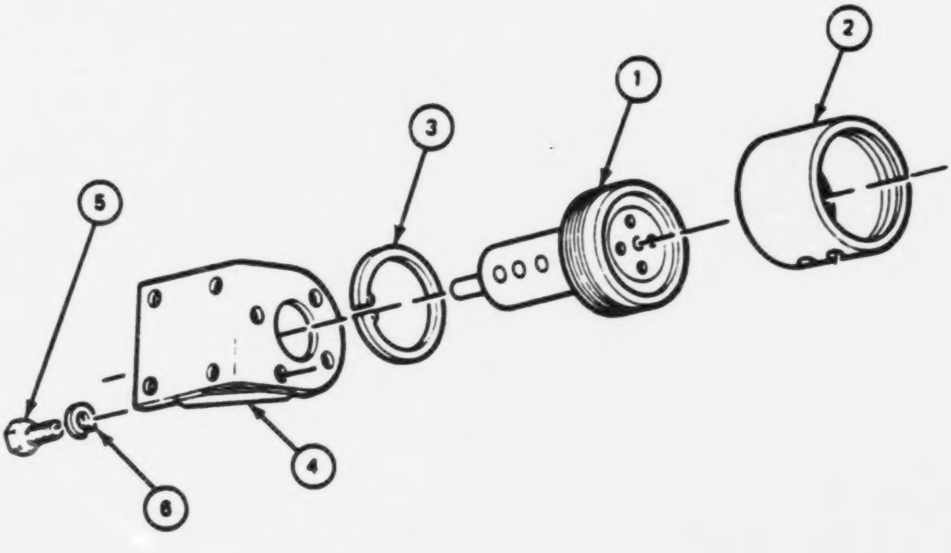
Step	Procedure
1.	Using O-ring extractor tool, put quad ring (packing) (1) in cover (2) (JPG).
2.	Put gasket (3) and cover (2) on body (4).
3.	Using screwdriver, attach cover (2) to body (4) with four screws (5) and four lockwashers (6).
	GO TO FRAME 9



17-4. SUPERELEVATION ACTUATOR ASSEMBLY PROCEDURE (CONT)

FRAME 9

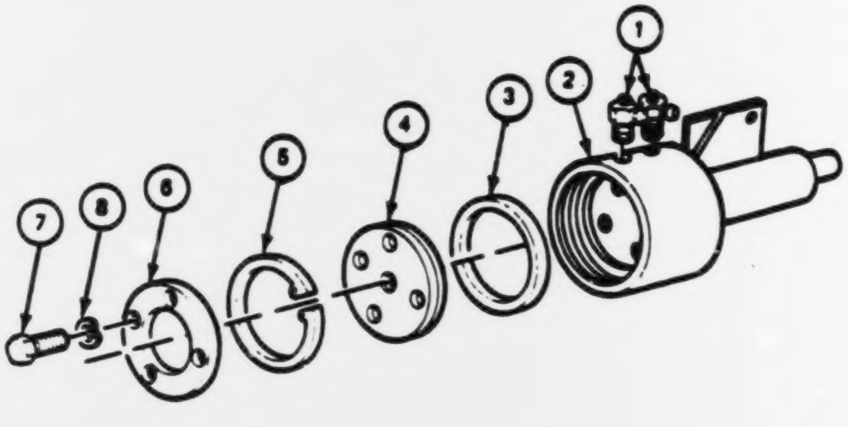
Step	Procedure
	NOTE Scribe line was put on during disassembly (para 17-3).
1.	Line up scribe line on body and piston (1), and housing (2).
2.	Put body and piston (1) in housing (2).
3.	Put housing (2) in vise.
4.	Using retaining ring pliers, put ring (3) in housing (2) (JPG).
5.	Line up scribe line on bracket (4) and housing (2).
6.	Using combination wrench, attach bracket (4) to body and piston (1) with four screws (5) and four lockwashers (6).
	GO TO FRAME 10



17-4. SUPERELEVATION ACTUATOR ASSEMBLY PROCEDURE (CONT)

FRAME 10

Step	Procedure
1.	Using adjustable wrench, attach two drain cocks (1) to housing (2).
2.	Using O-ring extractor tool, put preformed packing (3) on end plate (4) (JPG).
	NOTE It may be necessary to use soft faced hammer.
3.	Put end plate (4) in housing (2).
4.	Using retaining ring pliers, put retaining ring (5) in housing (2) (JPG).
5.	Using combination wrench, attach end plate ring (6) to end plate (4) with four screws (7) and four lockwashers (8).
6.	Remove housing (2) from vise.
	NOTE Follow-on Maintenance Action Required: Test superelevation actuator (para 17-2).
	END OF TASK



CHAPTER 18

TURRET RACE RING

18-1. MAINTENANCE PROCEDURES INDEX

	Tasks					
Equipment Item	Inspection	Test	Removal	Installation	Disassembly	Assembly
Turret Race Ring	18-2	18-3	18-4	18-5	18-6	18-7

18-2. TURRET RACE RING INSPECTION PROCEDURE

TOOLS: 1" micrometer

PERSONNEL: One

PRELIMINARY PROCEDURES: Disassemble turret race ring (para 18-6)

GENERAL INSTRUCTIONS:

NOTE

If part is bad, order repair part or next higher assembly, as required.

FRAME 1

Step	Procedure
1.	Using micrometer, check that free length of each spring is between 0.812" and 0.842". END OF TASK

18-3. TURRET RACE RING TEST PROCEDURE

SUPPLIES: Spring scale (50 pound capacity)
1/2" diameter rope (about 12 feet long)

PERSONNEL: One

REFERENCES: TM 9-2350-257-10 for procedure to elevate 105-mm gun
TM 9-2350-257-20-2-3 for procedure to adjust anti-backlash
JPG for procedure to use spring scale

EQUIPMENT CONDITION: Vehicle parked on level surface
Gun tube at zero elevation (TM-10)
Turret traverse lock set to UNLOCKED
Pinion drive gears removed using anti-backlash adjustment procedure (TM-20-2-3)

GENERAL INSTRUCTIONS:

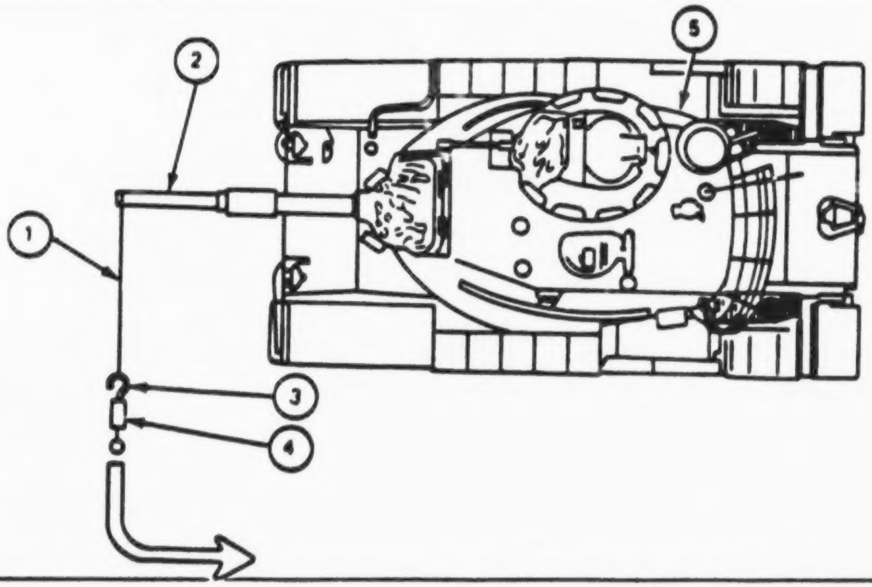
NOTE

If normal indication is not obtained, turret race ring is bad. Disassemble turret race ring (para 18-6).

18-3. TURRET RACE RING TEST PROCEDURE (CONT)

FRAME 1

Step	Procedure
1.	Tie one end of rope (1) to muzzle end of gun tube (2).
2.	Tie other end of rope (1) to hook (3) of spring scale (4).
	CAUTION Do not jerk on rope (1) or scale (4). Pull scale smoothly. Jerking can make scale give wrong indication.
3.	Holding scale (4) so that rope (1) and scale are straight out from gun tube (2) (about 90 degrees), pull turret (5) around one full turn (360 degrees). While pulling, watch scale indication. Scale must indicate under 12 pounds (after turret starts to turn).
4.	Repeat step 3, pulling turret (5) around in other direction.
	NOTE If normal indication is obtained, turret race ring is good. Follow-on Maintenance Action Required: Adjust anti-backlash (TM-20-2-3).
	END OF TASK



18-4. TURRET RACE RING REMOVAL PROCEDURE

TOOLS: Hoist, capable of lifting 20 tons or more and capable of raising hook at least 20 feet above ground
Turret lifting sling (NSN 4933-00-938-3008)
1-1/8" combination wrench
Turret stand (fabricated tool, item 5, App. B)
1-1/8" socket (3/4" drive)
3/4" drive hinged handle
3/4" drive ratchet
3" extension (3/4" drive)
Hoist, 5 ton capacity
Race ring sling (3 legs of 1/4" steel cable x 6' long each leg)
Eye bolts (NSN 5306-00-699-1282) (three)

SUPPLIES: 1/4" rope (30 feet long)
Masking tape (item 36, App. A)
Wood blocks (4" x 4" x 2') (three)

PERSONNEL: Five

REFERENCES: TM 9-2350-257-20-2-3 for procedures to remove:
- Loader's seat
- Commander's seat
- Turret traverse lock
- Azimuth indicator
- 7.62 mm ready round ammunition box
- 105 mm ammunition rack retainer
- Ballistic computer and mounting bracket
- Slipring
- Main accumulator and mounting bracket
- Elevating mechanism and mounting bracket
- Commander's filter hose

TM 9-2350-257-10 for procedures to:
- Traverse turret
- Depress gun

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Driver's Master Control Panel	4	10

18-4. TURRET RACE RING REMOVAL PROCEDURE (CONT)

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
Gun traversed over front slope (TM-10)
Gun set at maximum depression (TM-10)
Loader's seat removed (TM-20-2-3)
Commander's seat removed (TM-20-2-3)
Turret traverse lock removed (TM-20-2-3)
Ballistic computer and mounting bracket removed (TM-20-2-3)
Azimuth indicator removed (TM-20-2-3)
7.62-mm ready round ammunition box removed (TM-20-2-3)
105-mm ammunition rack retainer removed (TM-20-2-3)
Slipring removed (TM-20-2-3)
Accumulator and mounting bracket removed (TM-20-2-3)
Elevating mechanism and mounting bracket removed (TM-20-2-3)
Commander's filter hose removed (TM-20-2-3)

PRELIMINARY PROCEDURES: Remove power pack and mounting bracket (para 13-3)
Remove turret traversing mechanism (para 20-3)

GENERAL INSTRUCTIONS:

NOTE

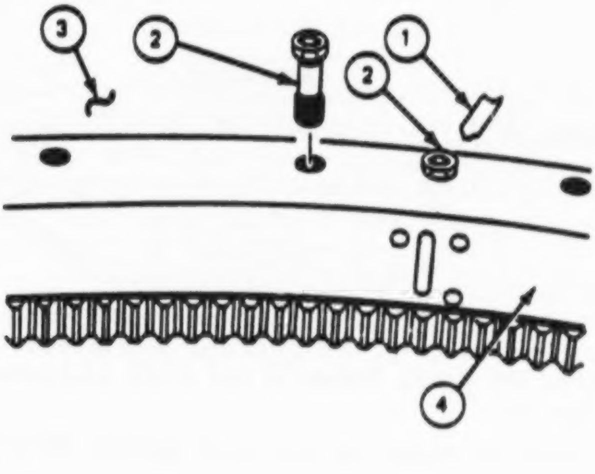
Keep bolts and brackets for installation.

This procedure is for removal of complete race ring or for work on race ring. Race ring does not have to be removed from hull for disassembly (para 18-6).

18-4. TURRET RACE RING REMOVAL PROCEDURE (CONT)

FRAME 1

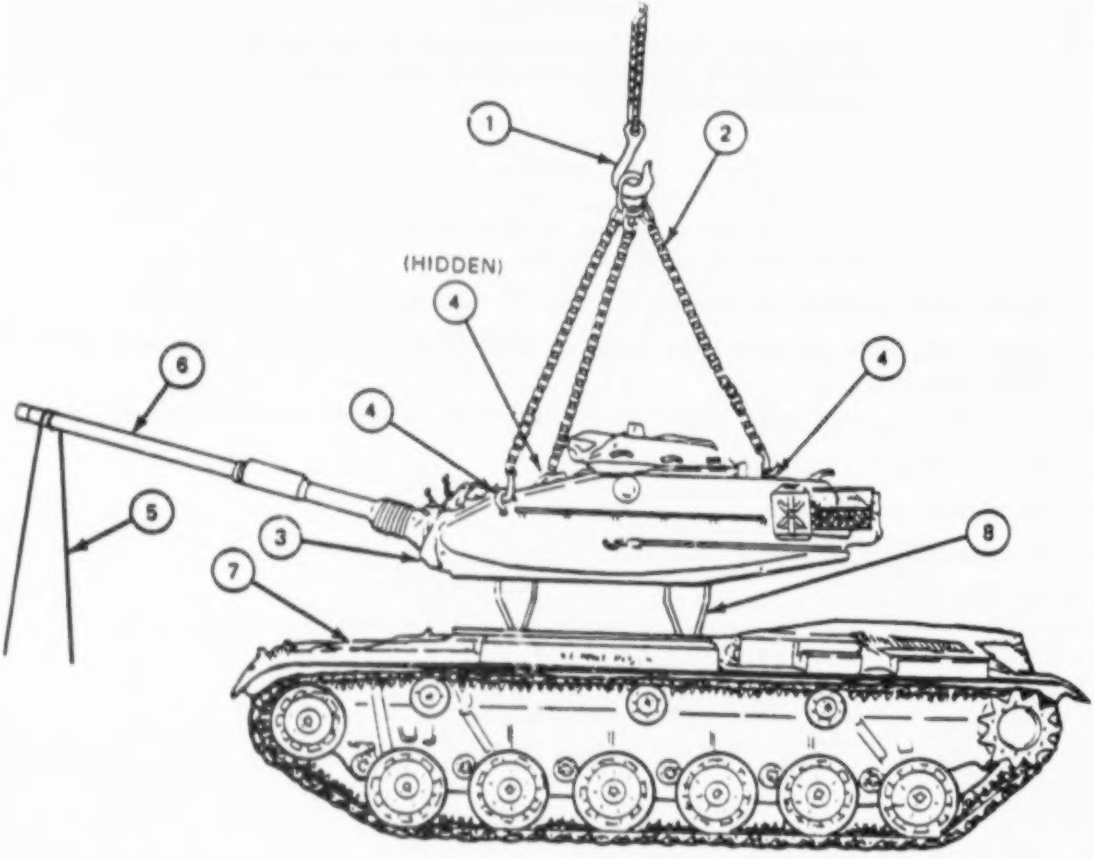
Step	Procedure
	NOTE This procedure will allow the turret to be separated from race ring and leave race ring on hull. The turret can then be put on turret stand and race ring replaced or worked on while on hull. Putting a piece of tape (1), next to bolts (2) that hold turret (3) to race ring (4), will make it easier to put bolts in proper holes when installing turret race ring (para 18-5).
1.	Using masking tape, put a piece of tape (1), next to each of the bolts (2) that hold turret (3) to race ring (4).
2.	Using socket wrench or combination wrench, remove 24 bolts (2) that hold turret (3) to race ring (4).
	GO TO FRAME 2



18-4. TURRET RACE RING REMOVAL PROCEDURE (CONT)

FRAME 2

Step	Procedure
	NOTE Turret sling (2) is heavy and awkward to handle. Hoist hook (1) should be used to lift sling.
1.	Using hoist, lower hoist hook (1) to sling (2) on floor.
2.	Put sling (2) on hoist hook (1).
3.	Raise hoist hook (1) with sling (2) and position hoist hook over center of turret (3).
4.	Put three hooks of sling (2) through three turret lifting eyes (4).
5.	Using rope (5), wrap two half hitches around gun tube (6) at middle of rope.
	WARNING Turret weighs nearly 20 tons. Do not get under turret (3) while it is on hoist. Turret could fall and hurt or kill you.
	CAUTION When lifting turret (3) from hull (7), do not let turret platform (8) bump against hull. Parts could be damaged. Turret must be lifted level and straight up.
	NOTE Soldier A will operate hoist. Soldiers B and C will be on each side of turret (3) to guide and check turret as it is lifted out of hull. Soldiers D and E will hold ends of rope (5).
6.	Using hoist, lift turret (3) straight up until turret platform (8) is clear of hull (7).
7.	Hold ends of rope (5) to steady turret (3) while turret is moved.
	GO TO FRAME 3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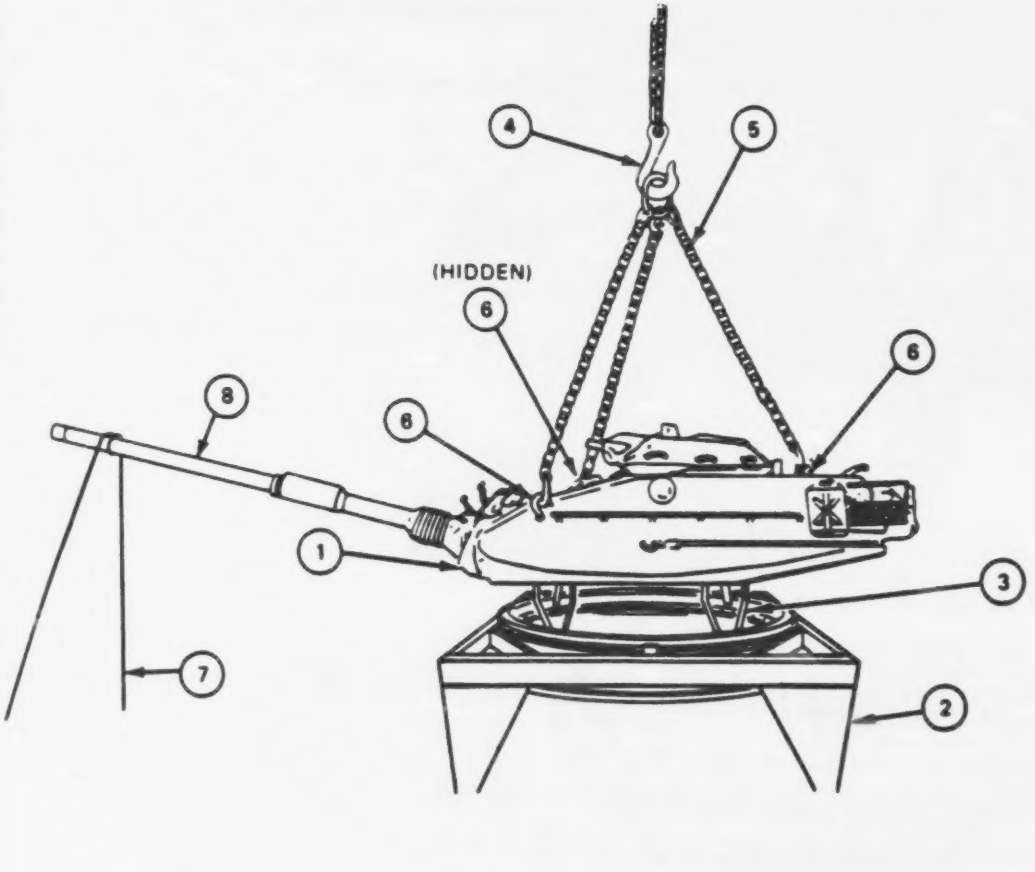
18-4. TURRET RACE RING REMOVAL PROCEDURE (CONT)

FRAME 3

Step	Procedure
1.	Using hoist, move turret (1) and position over turret stand (2). **CAUTION** When putting turret (1) on turret stand (2), do not let turret platform (3) bump against turret stand. Parts could be damaged. **NOTE** Soldiers B and C will be on each side of turret (1) to guide turret on turret stand (2).
2.	Lower turret platform (3) into turret stand (2) until turret (1) is on turret stand.
3.	Lower hoist hook (4) until three hooks of sling (5) can be removed from three turret lifting eyes (6).
4.	Move hoist hook (4) with sling (5) over clear area on floor and lower sling (5) to floor.
5.	Remove sling (5) from hoist hook (4).
6.	Move hoist to clear area.
7.	Remove rope (7) from gun tube (8).
	GO TO FRAME 4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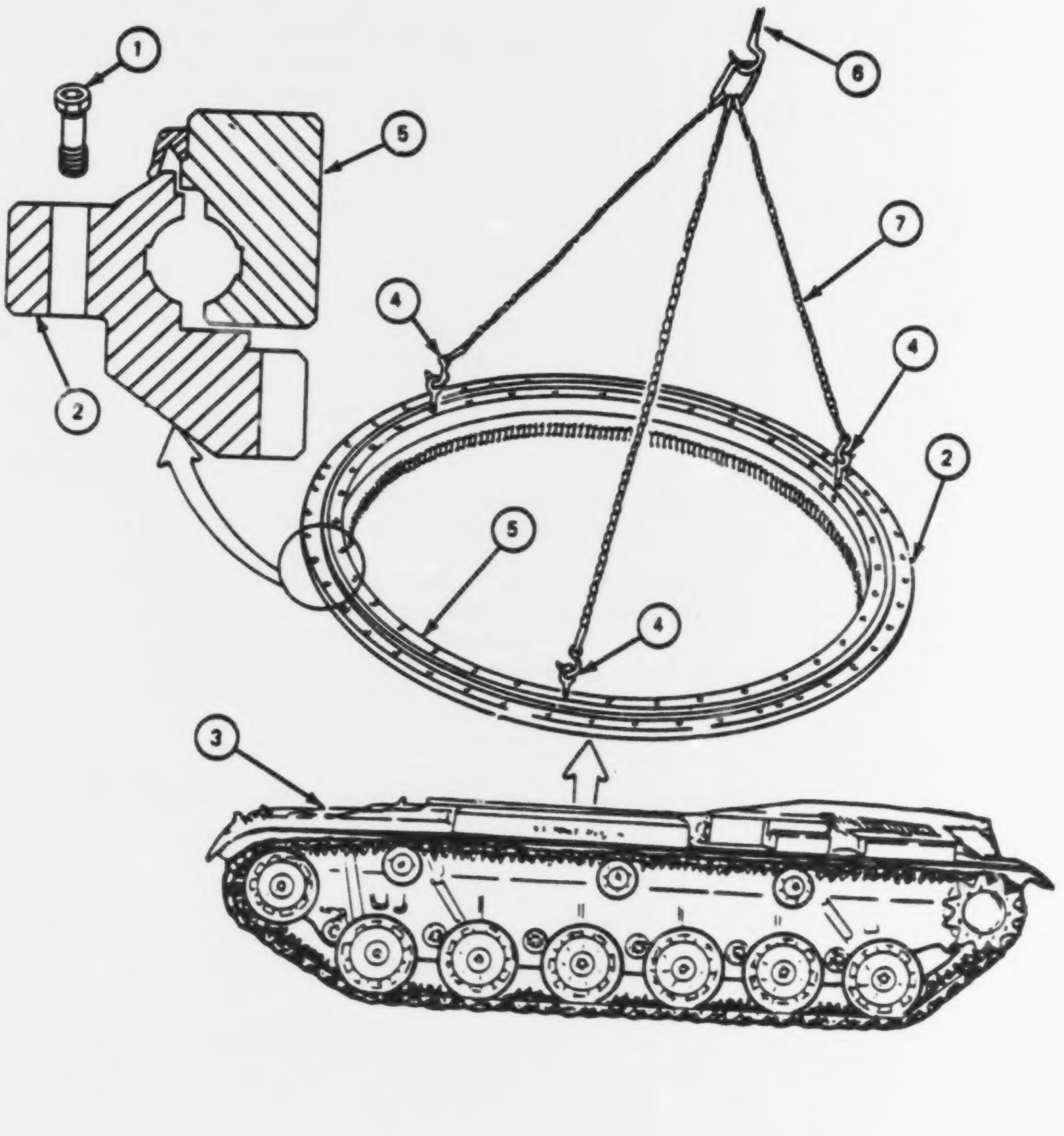
18-4. TURRET RACE RING REMOVAL PROCEDURE (CONT)

FRAME 4

Step	Procedure
1.	Using socket wrench, remove 48 screws (1) that attach race ring (2) to hull (3).
	NOTE Three eyebolts (4) must be evenly spaced (every 12 holes) around inner race (5).
2.	Put three eyebolts (4) in three threaded holes in inner race (5).
	NOTE Five ton hoist may be used to replace 20 ton hoist to lift race ring (2).
3.	Using hoist, lower hoist hook (6) and put sling (7) on hoist hook.
4.	Position hoist hook (6) over center of race ring (2) and put three hooks of sling (7) through three eyebolts (4).
	CAUTION Race ring (2) is positioned on three dowel pins and must be lifted evenly to prevent damage.
5.	Carefully lift race ring (2) from hull (3).
6.	Place three wood blocks on floor in circle.
7.	Using hoist, move race ring (2) and position over three wood blocks placed in circle on floor.
8.	Lower race ring (2) on three wood blocks.
9.	Remove sling (7) from three eyebolts (4) and hoist hook (6).
10.	Move hoist to clear area.
	END OF TASK



18-5. TURRET RACE RING INSTALLATION PROCEDURE

TOOLS: Hoist, capable of lifting 20 tons or more and capable of raising hook at least 20 feet above ground
Hoist, 5 ton capacity
Race ring sling (3 legs of 1/4'' steel cable x 6' long, each leg)
Turret lifting sling (NSN 4933-00-938-3008)
1-1/8'' combination wrench
3/4'' drive torque wrench (0-420 foot-pounds)
1-1/8'' socket (3/4'' drive)
8'' extension (3/4'' drive)
3/4'' drive ratchet

SUPPLIES: Grease (item 12, App. A)

PERSONNEL: Five

REFERENCES: TM 9-2350-257-20-2-3 for procedures to:
Install turret traverse lock
Install ballistic computer and mounting bracket
Install azimuth indicator
Install commander's seat
Install loader's seat
Install 7.62 mm ready round ammunition box
Install 105 mm ammunition rack retainer
Install slipring
Install main accumulator and mounting bracket
Install elevating mechanism and mounting bracket
Install commander's filter hose
TM 9-2350-257-10 for procedure to traverse and operate turret
JPG for procedure to use torque wrench

PRELIMINARY PROCEDURES: Assemble turret race ring (para 18-7)

GENERAL INSTRUCTIONS:

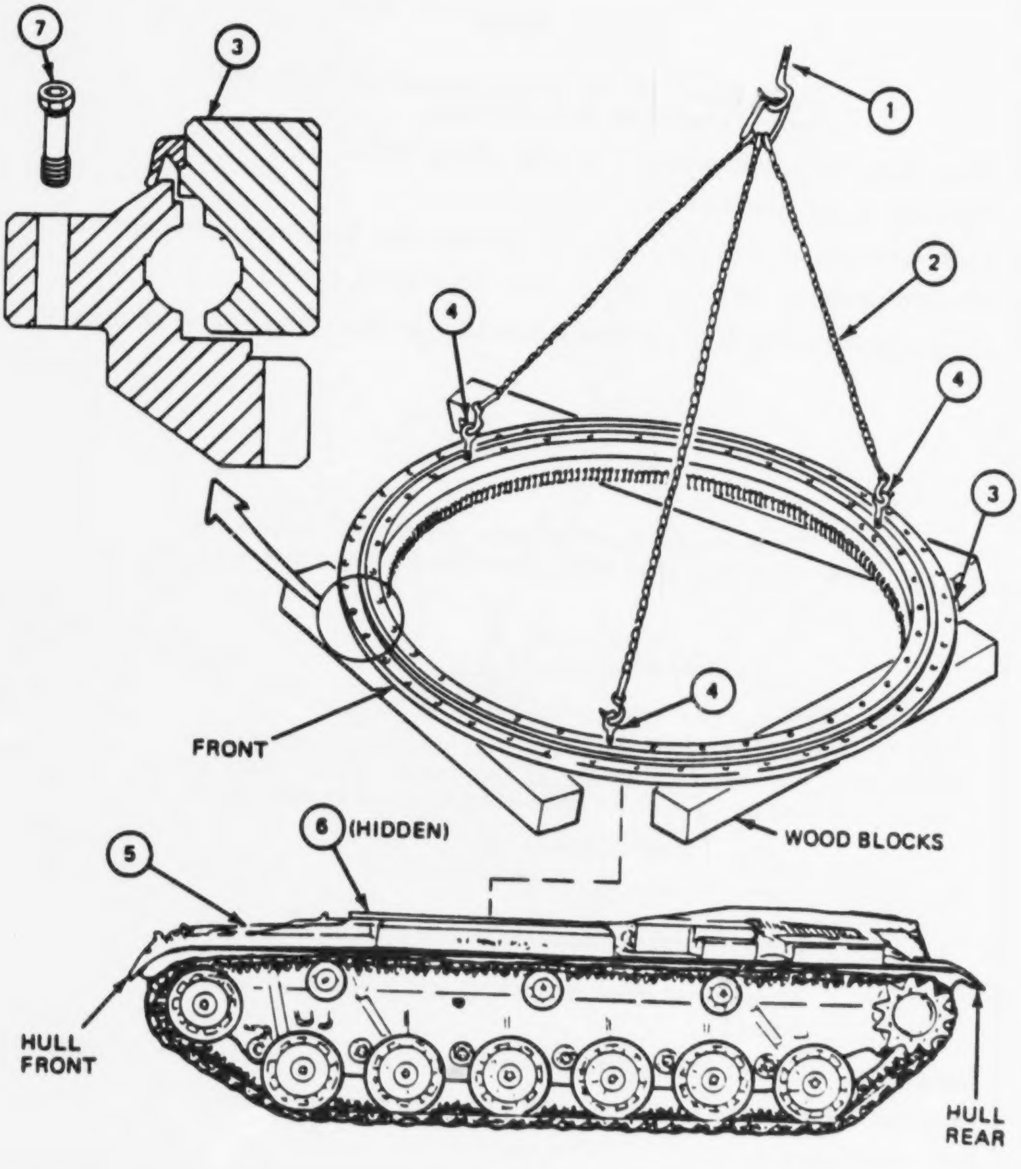
NOTE

Light coat of grease should be applied to all bolt threads that attach turret to race ring.

18-5. TURRET RACE RING INSTALLATION PROCEDURE (CONT)

FRAME 1

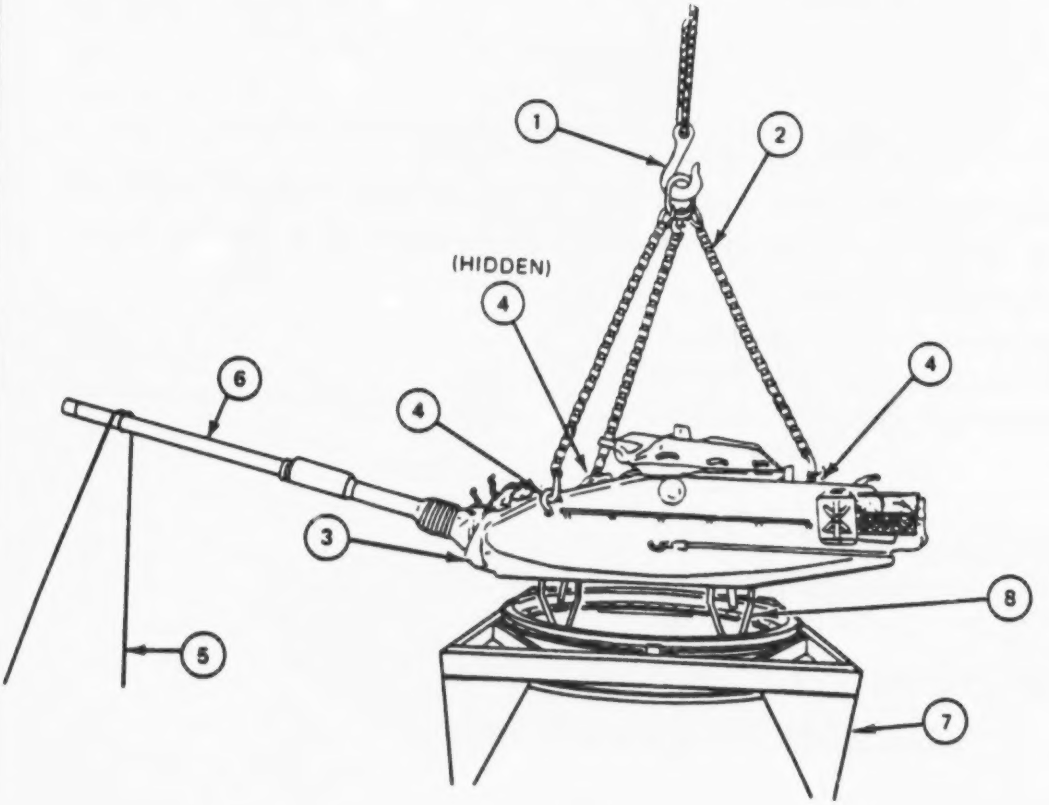
Step	Procedure
	NOTE If race ring was disassembled on hull, go to frame 2. Five ton hoist may be used to lift race ring.
1.	Using hoist, lower hoist hook (1) and put sling (2) on hoist hook.
2.	Position hoist hook (1) over center of race ring (3) on three wood blocks.
3.	Lower hoist hook (1) and put three hooks of sling (2) through three eyebolts (4).
4.	Lift race ring (3) and check that race ring is lifted evenly. Move race ring over hull (5).
	CAUTION Race ring (3) is positioned on three dowel pins in hull and must be lowered evenly to prevent damage.
	NOTE Outer ring of race ring (3) is marked "FRONT". Position toward front of hull.
5.	Carefully lower race ring (3) on three dowel pins (6) in hull (5).
6.	Remove sling (2) from three eyebolts (4) and hoist hook (1).
7.	Move hoist to clear area.
8.	Remove three eyebolts (4) from race ring (3).
9.	Using socket wrench, attach race ring (3) to hull (5) with 48 screws (7).
10.	Using torque wrench, tighten 48 screws (7) to between 300 and 350 foot-pounds (JPG).
	GO TO FRAME 2


FRONT
6 (HIDDEN)
WOOD BLOCKS
HULL FRONT
HULL REAR

18-5. TURRET RACE RING INSTALLATION PROCEDURE (CONT)

FRAME 2

Step	Procedure
	NOTE Turret sling (2) is heavy and awkward to handle. Hoist hook (1) should be used to lift sling.
1.	Using hoist, lower hoist hook (1) to sling (2) on floor.
2.	Put sling (2) on hoist hook (1).
3.	Raise hoist hook (1) with sling (2) and position hoist hook over center of turret (3).
4.	Put three hooks of sling (2) through three turret lifting eyes (4).
5.	Using rope (5), wrap two half hitches around gun tube (6) at middle of rope.
	WARNING Turret weighs nearly 20 tons. Do not get under turret (3) while it is on hoist. Turret could fall and hurt or kill you.
	CAUTION When lifting turret (3) from stand (7), do not let turret platform (8) bump against stand. Parts could be damaged. Turret must be lifted level and straight up.
	NOTE Soldier A will operate hoist. Soldiers B and C will be on each side of turret (3) to guide and check turret as it is lifted out of stand. Soldiers D and E will hold ends of rope (5).
6.	Using hoist, lift turret (3) straight up until turret platform (8) is clear of stand (7).
7.	Hold ends of rope (5) to steady turret (3) while turret is moved.
	GO TO FRAME 3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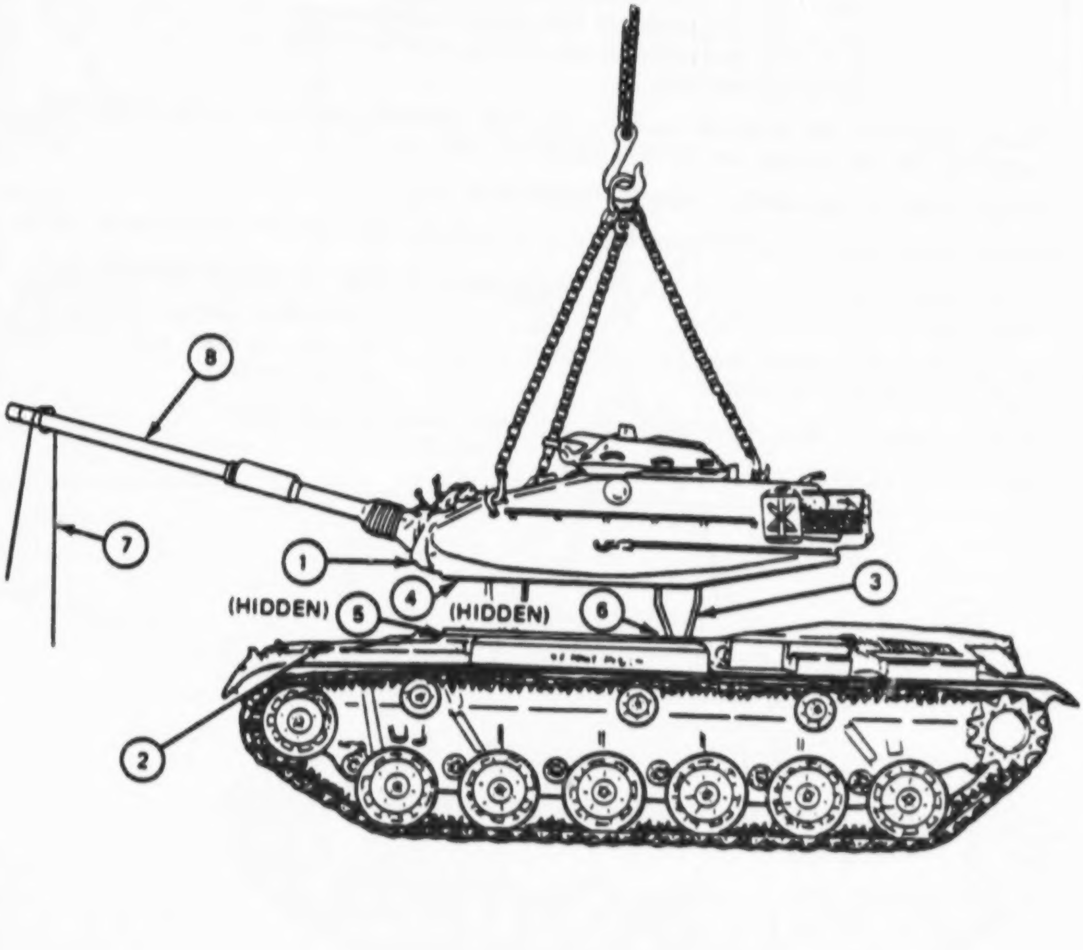
18-5. TURRET RACE RING INSTALLATION PROCEDURE (CONT)

FRAME 3

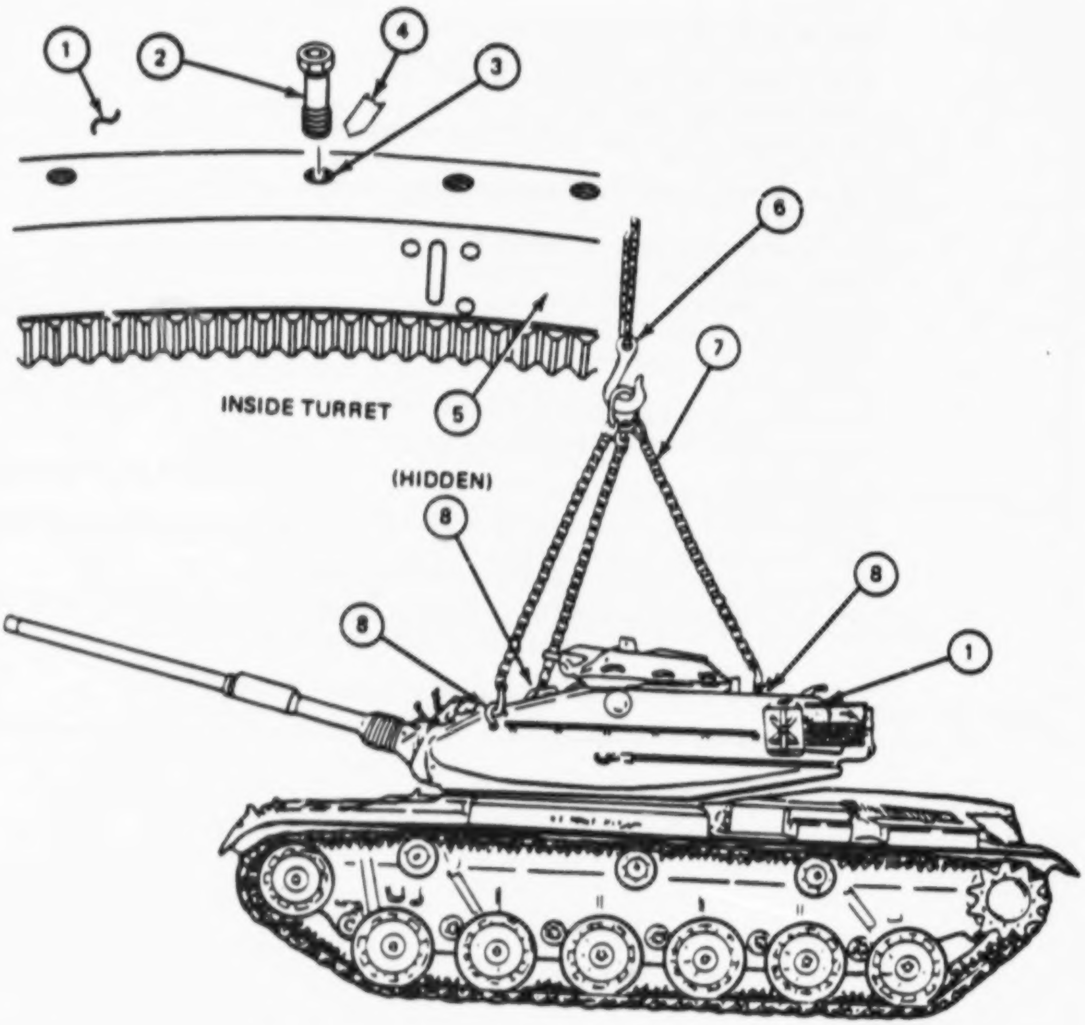
Step	Procedure
1.	Using hoist, move turret (1) and position over hull (2).
	CAUTION When putting turret (1) on hull (2), do not let turret platform (3) bump against hull. Parts could be damaged.
	NOTE Soldiers B and C will be on each side of turret (1) to guide and check turret as it is put in hull (2).
2.	Using hoist, carefully lower turret (1) into hull (2) until turret is about 1" above hull.
3.	Line up alignment pin (4) of turret (1) with alignment hole (5) in race ring (6).
4.	Using hoist, lower turret (1) on to hull (2).
5.	Remove rope (7) from gun tube (8).
	GO TO FRAME 4


(HIDDEN)
(HIDDEN)

18-5. TURRET RACE RING INSTALLATION PROCEDURE (CONT)

FRAME 4

Step	Procedure
	NOTE Turret (1) may have to be lifted slightly with hoist to get better alignment of bolt holes. Approximately 24 holes were marked with tape during removal of turret or traversing race ring.
1.	Inside turret (1), put bolts (2) in holes (3) with matching tape (4) marks. Make sure each bolt can be started into threaded hole in race ring (5).
2.	Using socket or combination wrench, tighten bolts (2).
3.	Using torque wrench, torque each bolt (2) to between 300 and 350 foot-pounds (JPG).
4.	Using hoist, lower hoist hook (6) until three hooks of sling (7) can be removed from three turret lifting eyes (8).
5.	Using hoist, move hoist hook (6) with sling (7) over clear area on floor and lower hoist hook until sling is on floor.
6.	Remove sling (7) from hoist hook (6) and move hoist to clear area.
	GO TO FRAME 5


INSIDE TURRET
(HIDDEN)

18-5. TURRET RACE RING INSTALLATION PROCEDURE (CONT)

FRAME 5

Step	Procedure
	NOTE Follow-on Maintenance Action Required: Install turret traversing mechanism (para 20-4). Install power pack and mounting bracket (para 13-4). Install main accumulator and mounting bracket (TM-20-2-3). Install elevating mechanism and mounting bracket (TM-20-2-3). Install turret traverse lock (TM-20-2-3). Install azimuth indicator (TM-20-2-3). Install commander's seat (TM-20-2-3). Install loader's seat (TM-20-2-3). Install 7.62-mm ready round ammunition box (TM-20-2-3). Install 105-mm ammunition rack retainer (TM-20-2-3). Install ballistic computer and mounting bracket (TM-20-2-3). Install slipring (TM-20-2-3). Install commander's filter hose (TM-20-2-3). Test turret traversing race ring (para 18-3). Operate turret in manual and power modes to make sure it works properly (TM-10). END OF TASK

18-6. TURRET RACE RING DISASSEMBLY PROCEDURE

TOOLS: Hoist, 5 ton capacity
Turret race lifting eyebolt (NSN 5306-00-699-1282) (three)
Race ring sling (3 legs of 1/4" steel cable x 6' long, each leg)
Fine stone
Scraper
Stiff bristled brush
Diagonal cutting pliers
1/2" drive ratchet
9/16" socket (1/2" drive)
Pan (9" diameter, 1-1/2" deep)
Spring wire hook tool (fabricated tool, item 6, App. B)
Knife
1/4" flat tip screwdriver

SUPPLIES: Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

PERSONNEL: Two

REFERENCES: JPG for procedures to:
Inspect and repair parts
Clean parts

PRELIMINARY PROCEDURES: Remove turret race ring (para 18-4) (see general instructions)

GENERAL INSTRUCTIONS:

NOTE

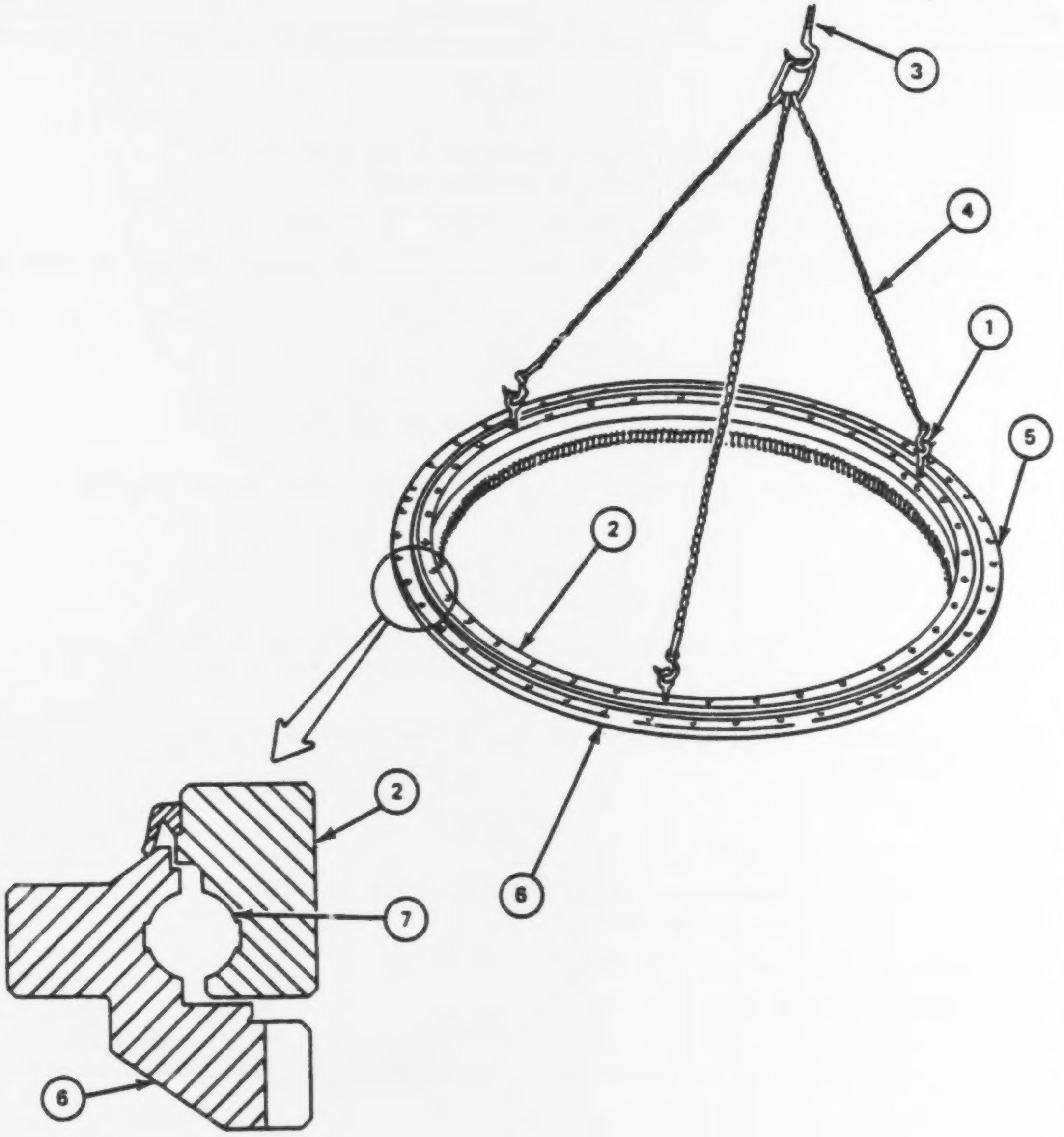
If outer race is going to be replaced, race ring should be disassembled after removal from vehicle (para 18-4).

If outer race is not going to be replaced, race ring could be disassembled while on vehicle.

18-6. TURRET RACE RING DISASSEMBLY PROCEDURE (CONT)

FRAME 1

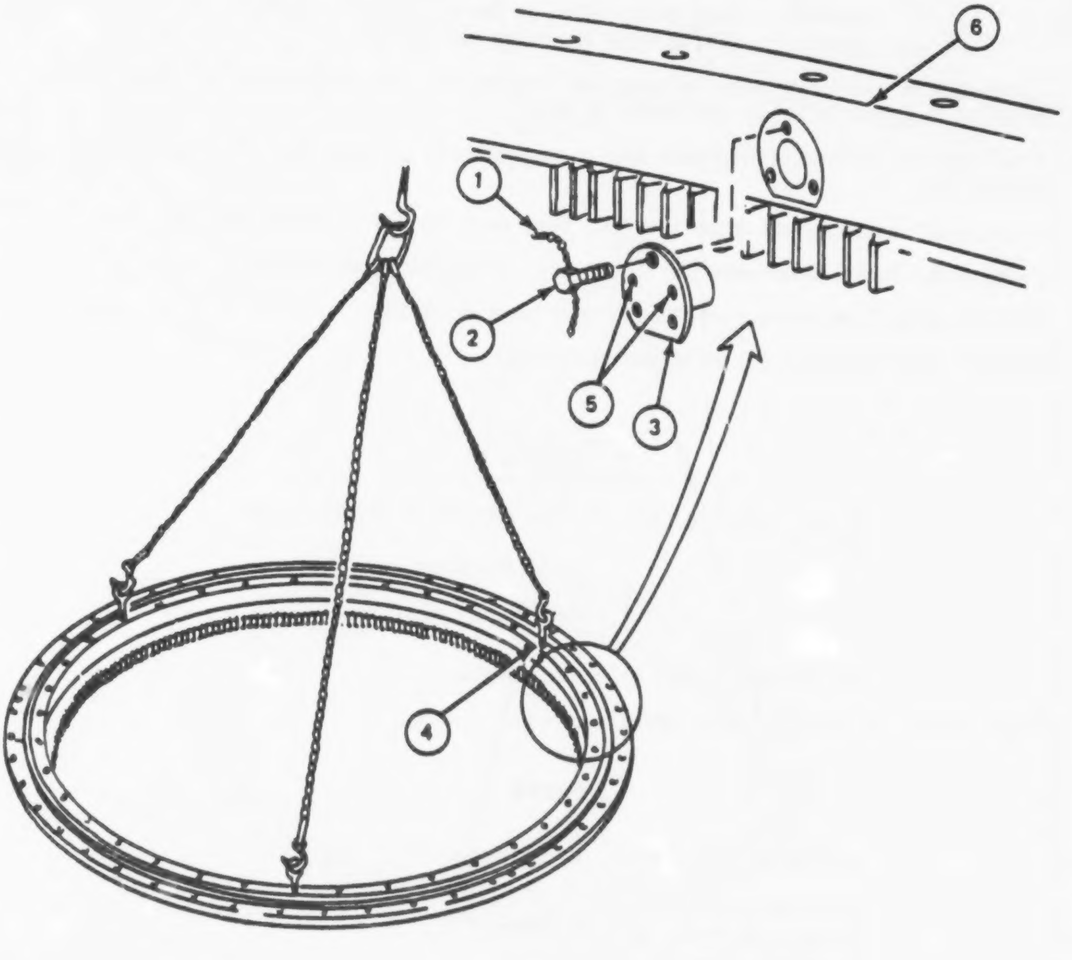
Step	Procedure
	NOTE Race ring (5) can be disassembled on or off vehicle. Go to step 2 if off vehicle because three eyebolts (1) should be installed. Three eyebolts (1) must be evenly spaced (every 12 holes) around inner race (2).
1.	Put three eyebolts (1) in three threaded holes in inner race (2).
2.	Using hoist, lower hoist hook (3) and put sling (4) on hoist hook.
3.	Position hoist hook (3) over center of race ring (2) and put three hooks of sling (4) through three eyebolts (1).
	NOTE Weight of inner race (2) should be taken off outer race (6) to make it easier to take races apart. Do not overlift.
4.	Raise inner race (2) about 1/16", or just enough to take weight off outer race (6) and ball bearings (7).
	GO TO FRAME 2



18-6. TURRET RACE RING DISASSEMBLY PROCEDURE (CONT)

FRAME 2

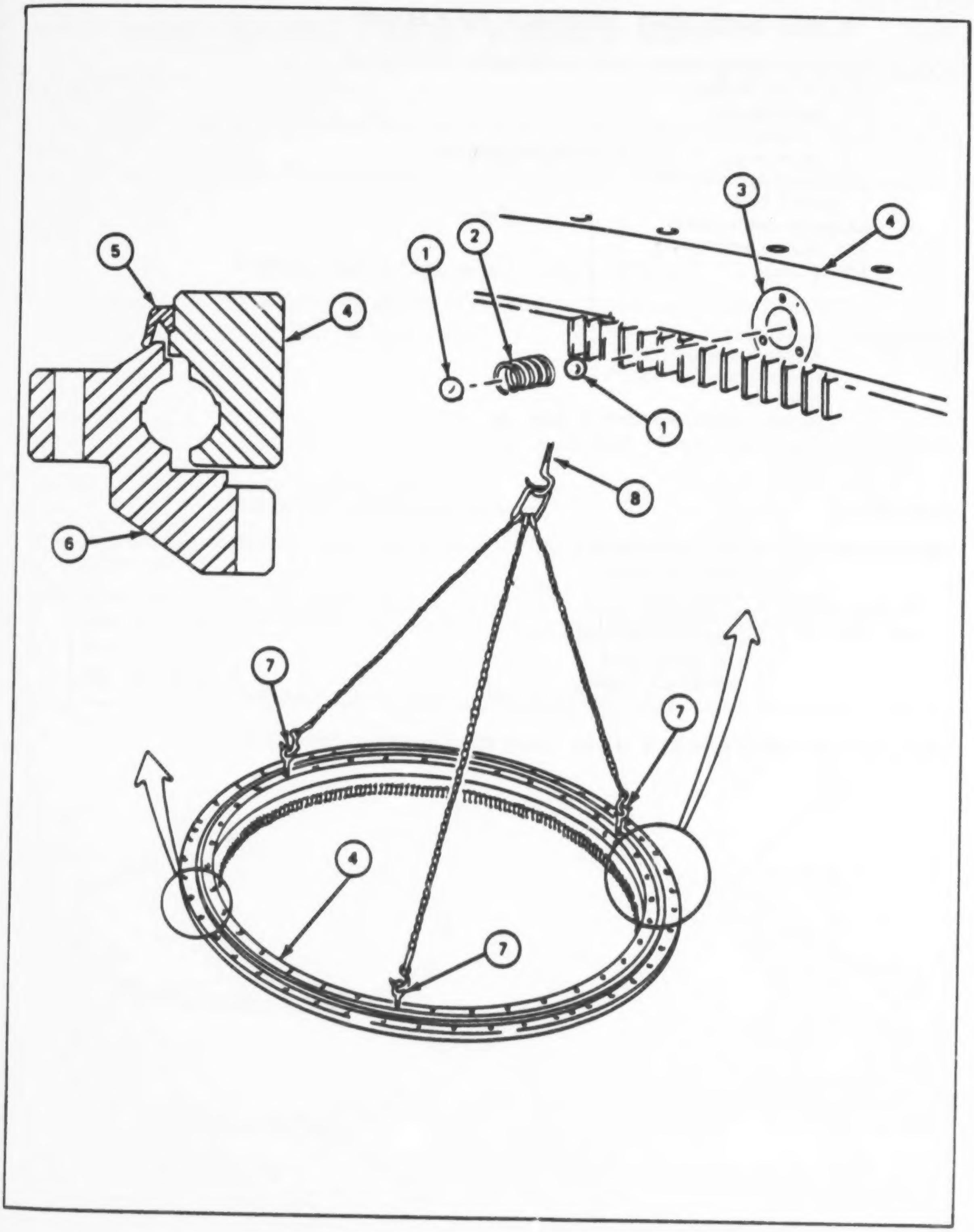
Step	Procedure
	NOTE Access hole for ball bearings and springs is covered with flanged plug (3) secured by three screws (2).
1.	Using pleirs, cut and remove lockwire (1) from three screws (2).
2.	Using socket wrench, remove three screws (2) that attach flanged plug (3) to inner race (4).
	NOTE Two of three screws (1) removed in step 2 will be used as jacking screws.
3.	Using hands, put two screws (1) in two jacking holes (5) in flanged plug (3).
	CAUTION When flanged plug is removed from inner race, do not let ball bearings or springs fall from access hole in inner race. Parts could get lost.
4.	Using socket wrench, tighten two screws (1) evenly to remove flanged plug (3) from inner race (6).
	NOTE Flanged plug (3) and inner race (6) are matched set. Keep flanged plug with inner race.
5.	Remove two screws (2) from flanged plug (3). GO TO FRAME 3



18-6. TURRET RACE RING DISASSEMBLY PROCEDURE (CONT)

FRAME 3

Step	Procedure
	NOTE Ball bearings are separated by coil springs. First ball bearing may be difficult to remove due to coil spring pressure. It may be necessary to use screwdriver to hold pressure on spring while removing ball bearing.
1.	Using spring wire hook tool, remove ball bearing (1) and coil spring (2) from access hole (3) in inner race (4). Put parts in pan.
2.	Turn race as required and repeat step 1 to remove 179 more ball bearings (1) and coil springs (2).
3.	Using hoist, carefully lift inner race (4) with seal (5) out of outer race (6).
4.	Using hoist, move inner race (4) and place on suitable work surface.
5.	Remove sling from three eyebolts (7) and hoist hook (8).
6.	Remove three eyebolts (7) from inner race (4).
	CAUTION When removing seal (5), do not cut or scratch inner race (4). **NOTE** Do not remove seal except to replace.
7.	Using knife, cut seal (5) from inner race (4).
	NOTE Follow-on Maintenance Action Required: Clean all parts (JPG). Inspect and repair all parts (JPG). Do detail inspection (para 18-2).
	END OF TASK



18-7. TURRET RACE RING ASSEMBLY PROCEDURE

TOOLS: Turret race lifting eyebolt (NSN 5306-00-699-1282) (three)
Hoist, 5 ton capacity
1/2" drive ratchet
9/16" socket (1/2" drive)
1/2" drive torque wrench (0 to 250 foot-pounds)
Slip joint pliers with cutter
1" brush (three)
Diagonal cutting pliers
1/4" flat tip screwdriver
Spring scale

SUPPLIES: Ball race seal
Adhesive (item 4, App. A)
Grease (item 12, App. A)
Lockwire
Silicone compound (item 9, App. A)
Clean rags (item 21, App. A)

PERSONNEL: Three

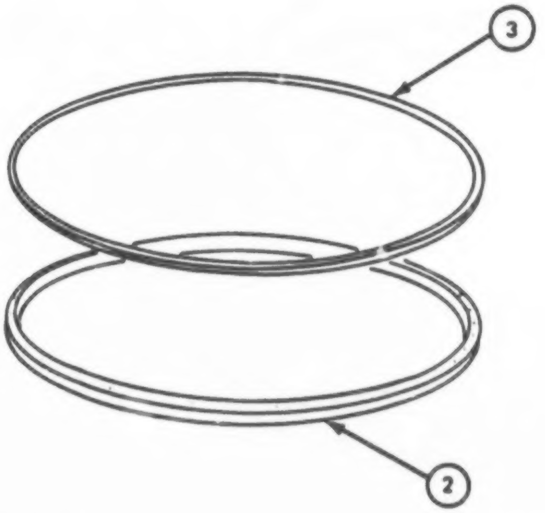
REFERENCES: JPG for procedures to:
Apply adhesive
Apply grease
Install lockwire
Apply silicone compound
Use spring scale
Use torque wrench
LO 9-2350-257-12 for procedure to lubricate turret race ring

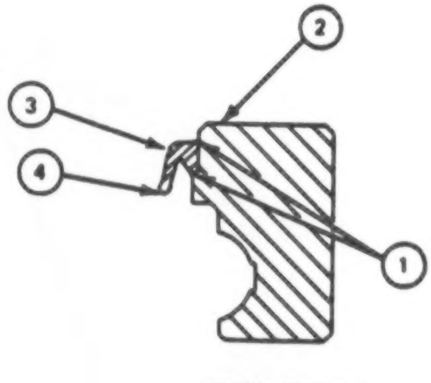
PRELIMINARY PROCEDURES: Inspect turrent race ring springs (para 18-2)

18-7. TURRET RACE RING ASSEMBLY PROCEDURE (CONT)

FRAME 1

Step	Procedure
	NOTE If seal on inner race was not removed, go to frame 2.
1.	Using brush, put adhesive on groove (1) around outside of inner race (2) (JPG).
2.	Using brush, put adhesive on inner surface of seal (3) that fits in groove (1) of inner race (2) (JPG).
	CAUTION When installing seal (3) on inner race (2), make sure that skirt (4) of seal hangs down.
3.	Put seal (3) on inner race (2). Make sure seal fits groove (1) evenly all the way around inner race.
4.	After adhesive has set, check seal (3). Using spring scale, seal must withstand a pull on skirt (4) of seal (3) (of five pounds) at any point without pulling away from inner race (2).
	GO TO FRAME 2





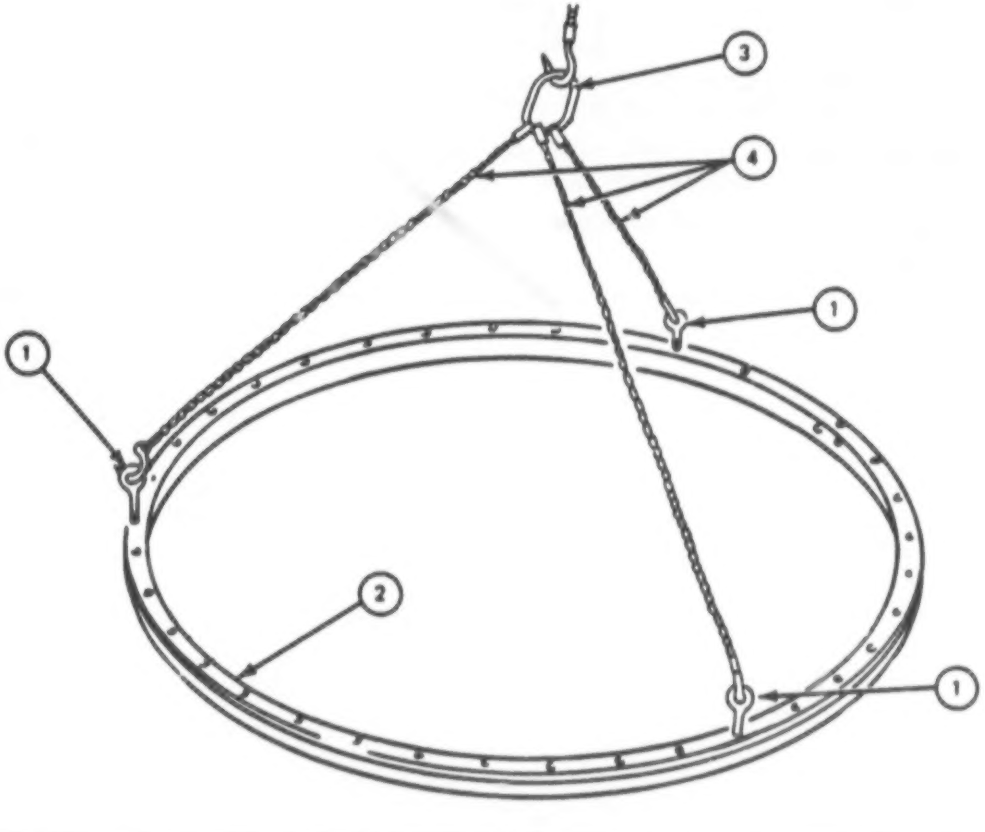
CROSS SECTION
(SEAL INSTALLED)

Para 18-7 Cont

18-7. TURRET RACE RING ASSEMBLY PROCEDURE (CONT)

FRAME 2

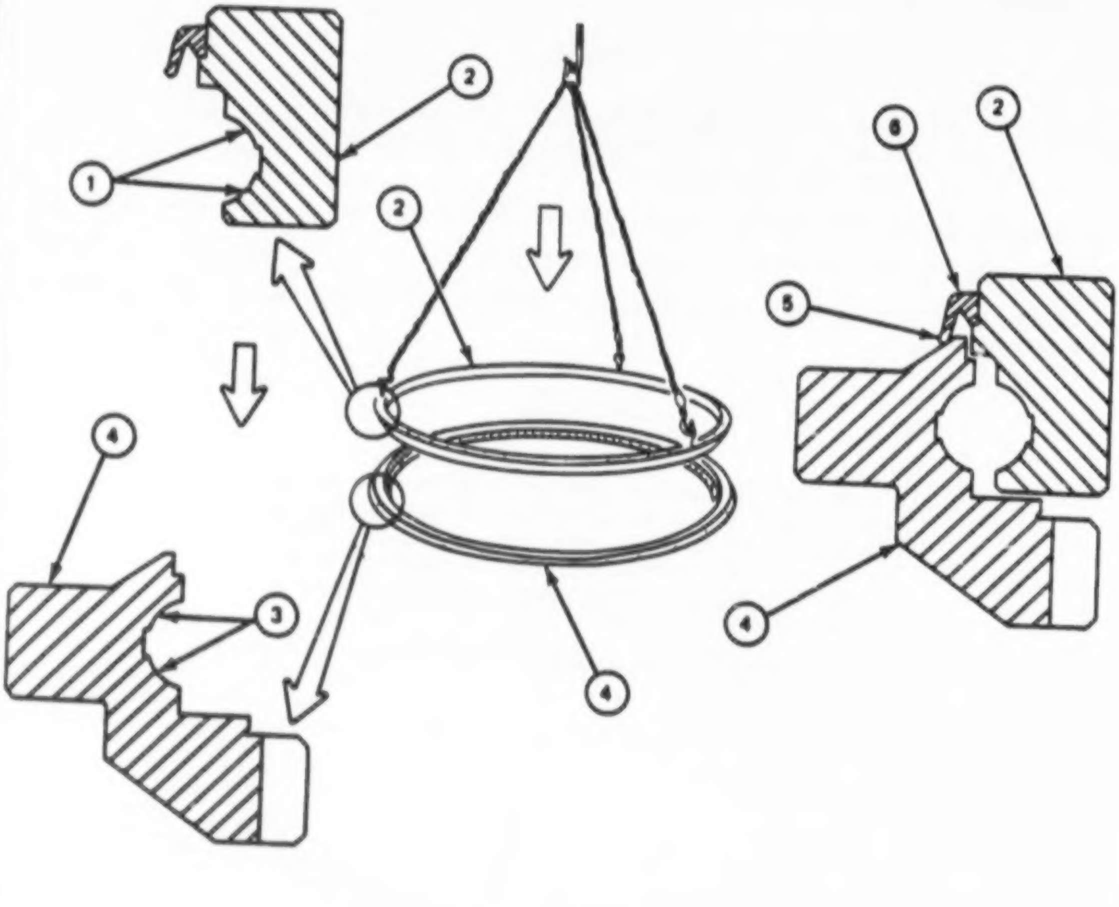
Step	Procedure
	NOTE Three eyebolts (1) must be evenly spaced (every 12 holes) around inner race (2).
1.	Put three eyebolts (1) in three threaded holes in inner race (2).
2.	Using hoist, lower hoist hook (3) and put sling (4) on hoist hook.
3.	Position hoist hook (3) over center of inner race (2) and put three hooks of sling (4) through three eyebolts (1).
4.	Raise inner race off work surface to about waist high.
	GO TO FRAME 3



18-7. TURRET RACE RING ASSEMBLY PROCEDURE (CONT)

FRAME 3

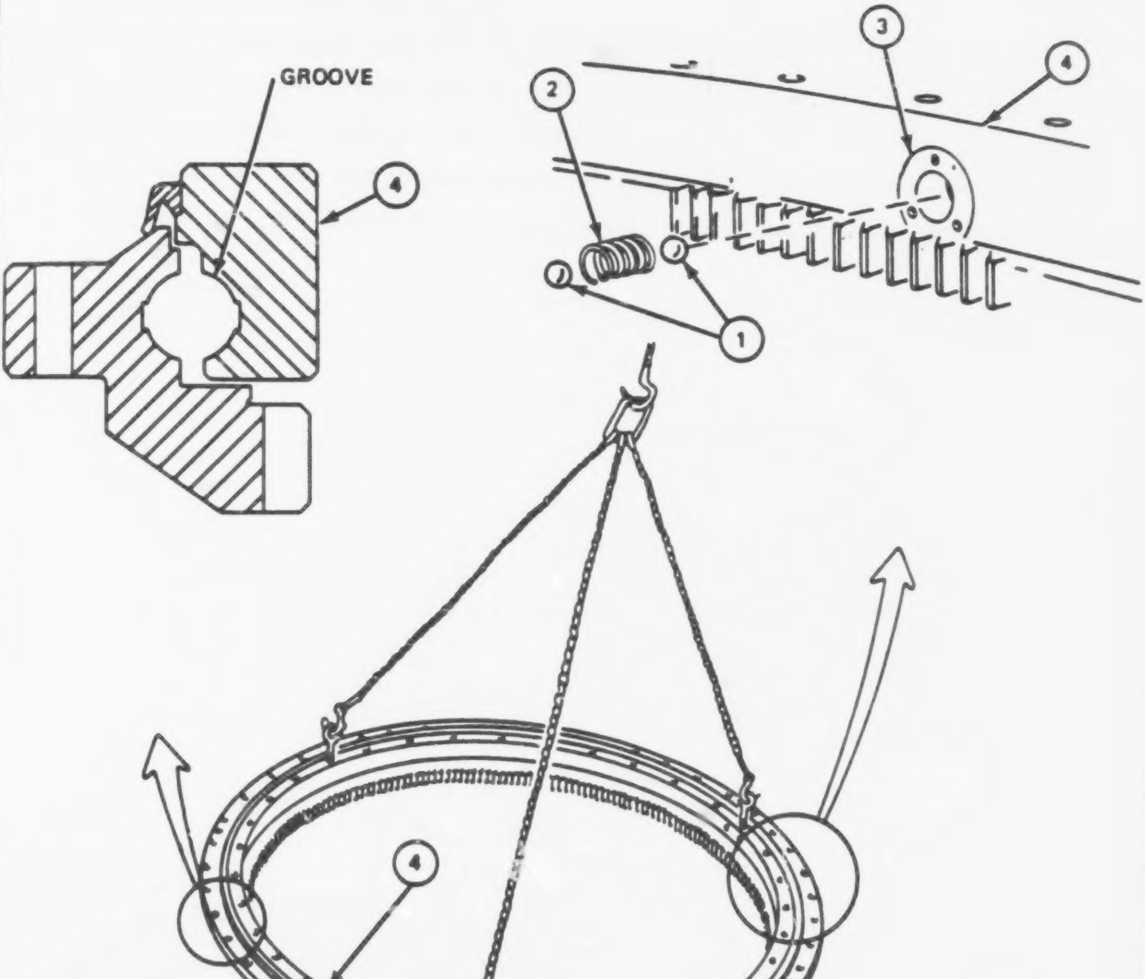
Step	Procedure
	NOTE Grease should be applied in a light even coat.
1.	Using brush, coat ball race (1) of inner race (2) with grease (JPG).
	NOTE Outer race may be in hull or on three wood blocks.
2.	Using brush, coat ball race (3) of outer race (4) with grease (JPG).
3.	Using hoist, position hoist with inner race (2) over outer race (4).
	CAUTION Do not allow skirt (5) of seal (6) to get caught between inner and outer race. Seal may be cut or damaged.
4.	Carefully lower inner race (2) into outer race (4). Do not lower inner race completely. Try to keep a small amount of clearance.
5.	Check skirt (5) of seal (6) all around to make sure skirt is on top of outer race (4). GO TO FRAME 4



18-7. TURRET RACE RING ASSEMBLY PROCEDURE (CONT)

FRAME 4

Step	Procedure
1.	Using hands, coat ball bearing (1) with grease (JPG).
2.	Using hands, coat spring (2) with grease (JPG).
3.	Put ball bearing (1) into access hole (3) in inner race (4).
	NOTE Inner race may have to be lifted, with hoist slightly to make it easier to put ball bearing in groove between inner and outer race.
4.	Using hands, put ball bearing (1) into groove and move to left of access hole (3).
5.	Put spring (2) into access hole (3) in inner race (4).
6.	Using hands, turn spring (2) so that coil of spring lies along groove and move to left of access hole (3).
	CAUTION Count each ball bearing and spring as they are put in. Turret could jam if wrong number of ball bearings or springs are put in. Make sure there is only one spring between two ball bearings. It may be necessary to use screwdriver to push springs to one side when putting in last ball bearing.
7.	Repeat steps 1 through 6 for 179 more ball bearings (1) and springs (2). GO TO FRAME 5

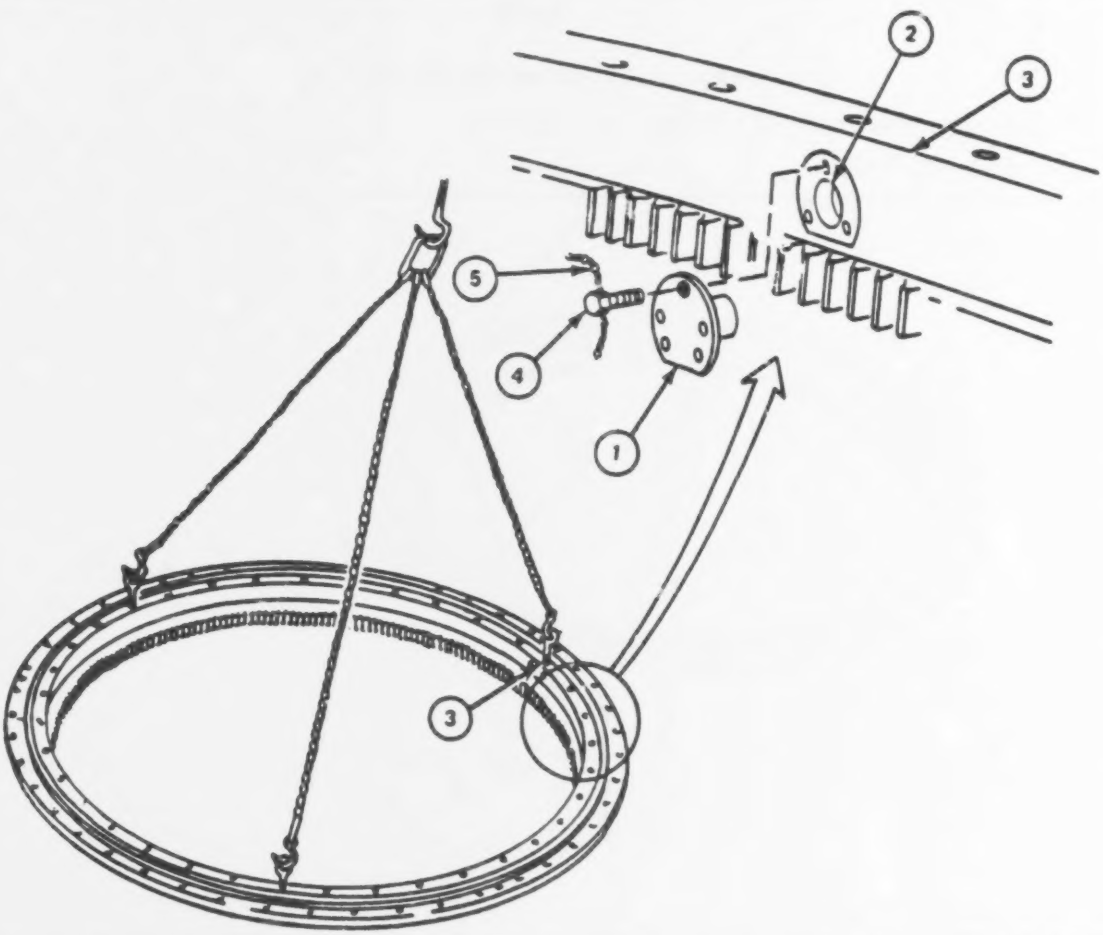

GROOVE
4
3
4
2
1
4

Para 18-7 Cont

18-7. TURRET RACE RING ASSEMBLY PROCEDURE (CONT)

FRAME 5

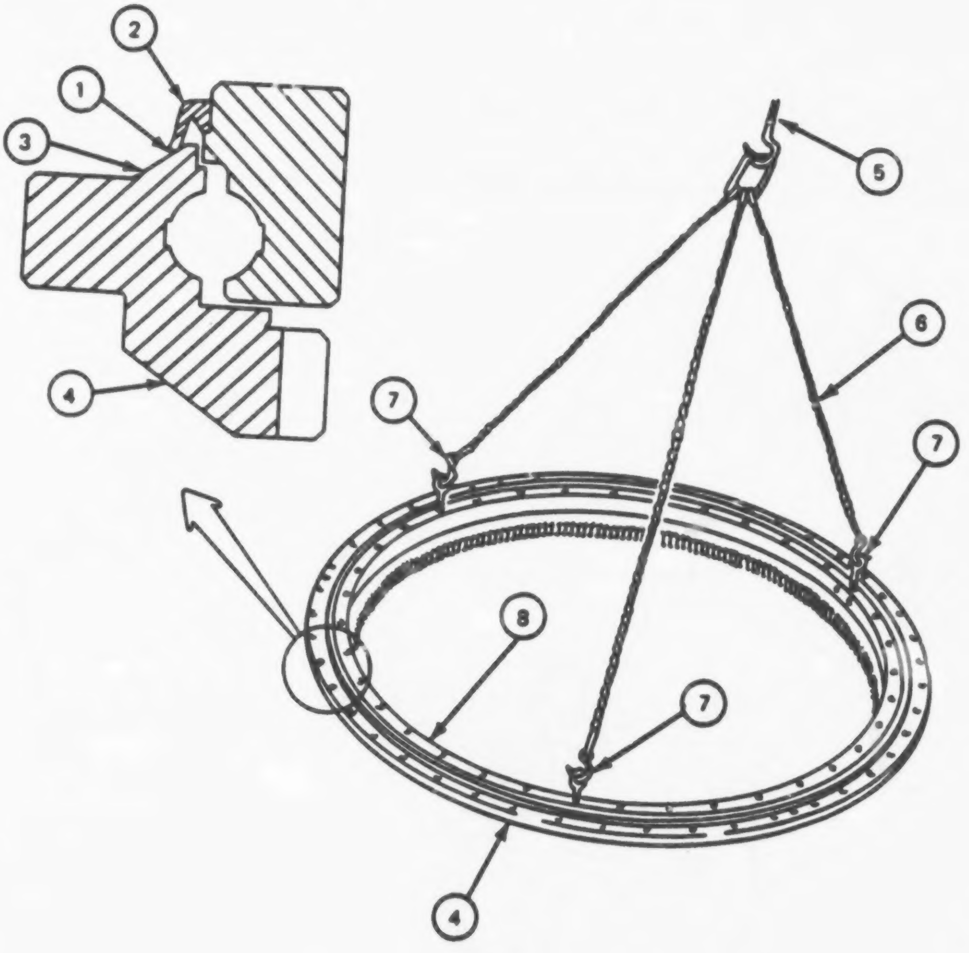
Step	Procedure
1.	Using hands, coat small end of plug (1) with grease (JPG).
2.	Put plug (1) into access hole (2) of inner race (3). Push plug in until seated.
3.	Put three screws (4) in three holes of plug (1) without threads.
4.	Using socket wrench, tighten screws (4).
5.	Using torque wrench, torque three screws (4) to between 25 and 30 foot-pounds (JPG).
6.	Using slip joint and cutting pliers, install lockwire (5) through lockwire holes in three screws (4) (JPG). . GO TO FRAME 6



18-7. TURRET RACE RING ASSEMBLY PROCEDURE (CONT)

FRAME 6

Step	Procedure
1.	Lift skirt (1) of seal (2) slightly. Using brush, put silicone compound on outer surface (3) of outer race (4) (under skirt of seal) (JPG). Put compound all around outer race.
2.	Lubricate turret race ring (LO).
3.	Using hoist, lower hoist hook (5) and remove three hooks of sling (6) from three eyebolts (7).
4.	Remove sling (6) from hoist hook (5).
5.	Move hoist out of way.
6.	Check that inner race (8) turns freely in both directions.
	NOTE If race ring was assembled on hull, do step 7.
7.	Remove three eyebolts (7) from inner race (8).
	END OF TASK

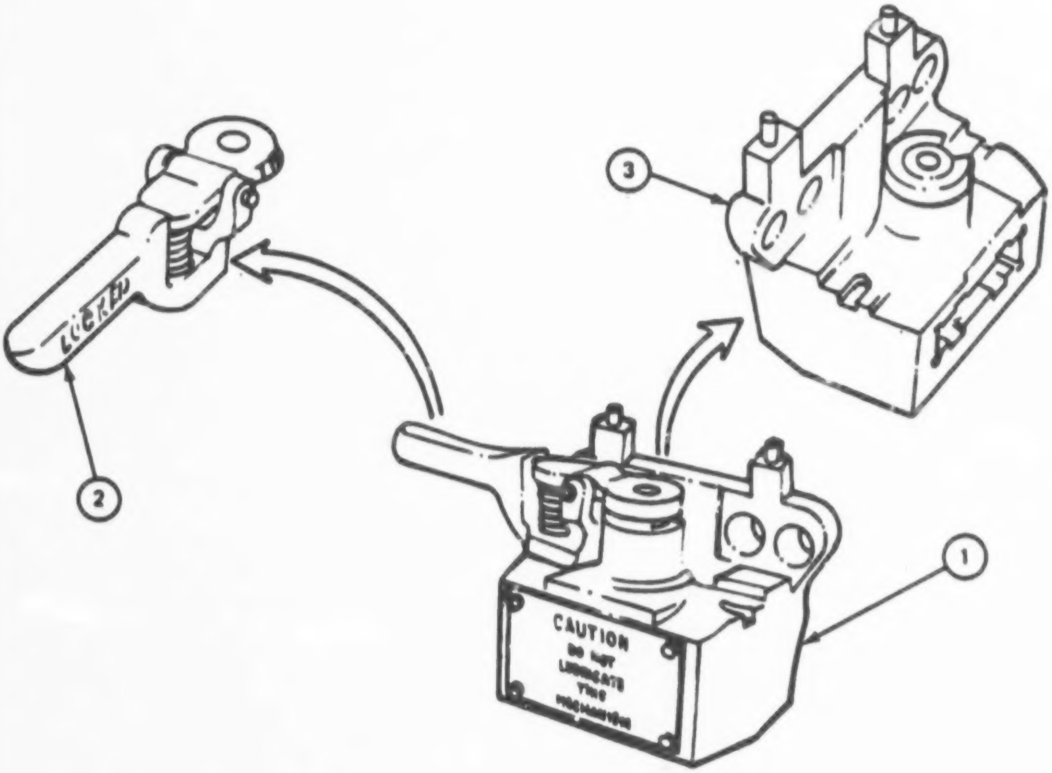


CHAPTER 19

TURRET TRAVERSE LOCK

19-1. MAINTENANCE PROCEDURES INDEX

	Tasks						
Equipment Item	Inspection	Test	Removal	Installation	Disassembly	Assembly	Repair
1. Turret Traverse Lock	19-2	19-3	. . .	. . . .	19-4	19-5	19-6
2. Handle	. . .	. . .	19-7	19-8	19-7	19-8	. . .
3. Housing	. . .	. . .	. . .	. . .	19-9	19-10	. . .



19-2. TURRET TRAVERSE LOCK INSPECTION PROCEDURE

PERSONNEL: One

PRELIMINARY PROCEDURES: Remove and disassemble handle (para 19-7)
Disassemble housing (para 19-9)

GENERAL INSTRUCTIONS:

NOTE

If part is bad, order repair part or next higher assembly, as required. Refer to section index (para 19-1) for replacement of parts.

19-2. TURRET TRAVERSE LOCK INSPECTION PROCEDURE (CONT)

FRAME 1

Step **Procedure**

SUPPORT SHOP WORK

1. Take turret traverse lock parts to shop where inspection equipment is available.
2. Make dimensional check.

Reference Letter	Point of Measurement	Measurement
A	OD of lever shaft	0.628 to 0.629
B	ID of pin hole in turret lock lever	0.2488 to 0.2498
C	Diameter of pin	0.2509 to 0.2511
D	Free length of spring	2.10 to 2.12
E	OD of pin	0.365 to 0.370
F	ID of pin bore in handle	0.371 to 0.372
G	OD of pin	0.373 to 0.374
H	ID of bore in camshaft	0.8127 to 0.8137
J	OD of sleeve bearing	0.815 to 0.816
K	ID of bore	0.371 to 0.372
L	ID of bearing	0.630 to 0.631
M	OD of bearing	1.377 to 1.378
N	ID of bore turret lock housing	1.375 to 1.376
P	ID of bushing	1.125 to 1.126

NOTE

Tag parts that are out of tolerance.

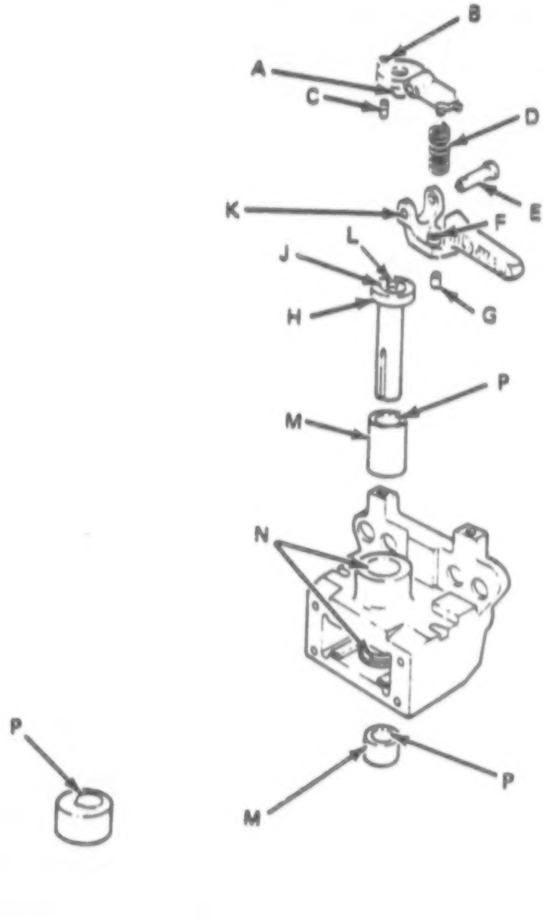
3. After support shop work, return turret traverse lock parts to turret shop.

NOTE

If measurements of pins (C), (G) are out of tolerance, replace pins (para 19-6).

If measurements of bearings (M), (P) are out of tolerance, replace bearings (para 19-6).

END OF TASK


B
A
C
D
E
K
F
L
J
G
H
P
M
N
P
P
M

19-3. TURRET TRAVERSE LOCK TEST PROCEDURE

TOOLS: Depth micrometer

SUPPLIES. Steel rod, approximately .480 diameter, 8" long (two)
20 lb weight

PERSONNEL: One

REFERENCES: TM 9-2350-257-20-2-3 for procedure to remove turret traverse lock
JPG for procedure to use micrometer

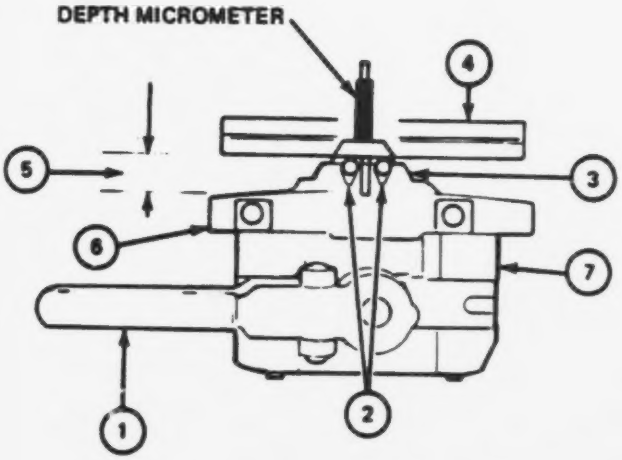
EQUIPMENT CONDITION: Turret traverse lock removed (TM-20-2-3)

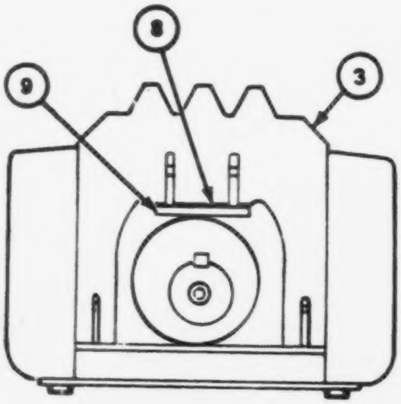
PRELIMINARY PROCEDURES: Assemble turret traverse lock (para 19-5)

19-3. TURRET TRAVERSE LOCK TEST PROCEDURE (CONT)

FRAME 1

Step	Procedure
1.	Lift handle (1) and put in LOCKED position.
2.	Put two rods (2) between bolt (3) teeth.
3.	Center weight (4) on rods (2).
	NOTE Distance (5) from top of rods (2) to top of lock flange (6) must be between .799" and .803" for proper bolt (3) movement.
4.	Using depth micrometer, measure distance (5) (JPG).
	NOTE If distance (5) measurement was not right, turret traverse lock (7) housing must be disassembled (para 19-9) to add or remove .002" laminations from shim (8) between bolt (3) and wear plate (9), then assembled (para 19-10).
	END OF TASK





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19-4. TURRET TRAVERSE LOCK DISASSEMBLY PROCEDURE

PERSONNEL: One

REFERENCES: TM 9-2350-257-20-2-3 for procedure to remove turret traverse lock

EQUIPMENT CONDITION: Turret traverse lock removed (TM-20-2-3)

PRELIMINARY PROCEDURES: Test turret traverse lock (para 19-3)

FRAME 1

Step	Procedure
1.	Remove and disassemble handle (para 19-7).
2.	Disassemble housing (para 19-9).
	NOTE
	Follow-on Maintenance Action Required:
	Inspect turret traverse lock (para 19-2)
	END OF TASK

19-5. TURRET TRAVERSE LOCK ASSEMBLY PROCEDURE

PERSONNEL: One

PRELIMINARY PROCEDURES: Inspect turret traverse lock (para 19-2)

FRAME 1

Step	Procedure
1.	Assemble housing and related parts (para 19-10).
2.	Assemble and install handle and related parts (para 19-8).
	NOTE
	Follow-on Maintenance Action Required:
	Test turret traverse lock (para 19-3).
	END OF TASK

19-6. TURRET TRAVERSE LOCK REPAIR PROCEDURE

SUPPLIES: Bearings
Pins

PERSONNEL: One

PRELIMINARY PROCEDURES: Inspect turret traverse lock (para 19-2)

GENERAL INSTRUCTIONS:

NOTE

Procedure is used to replace bad pins and bearings in housing. If part is bad, order repair part or next higher assembly, as required.

FRAME 1

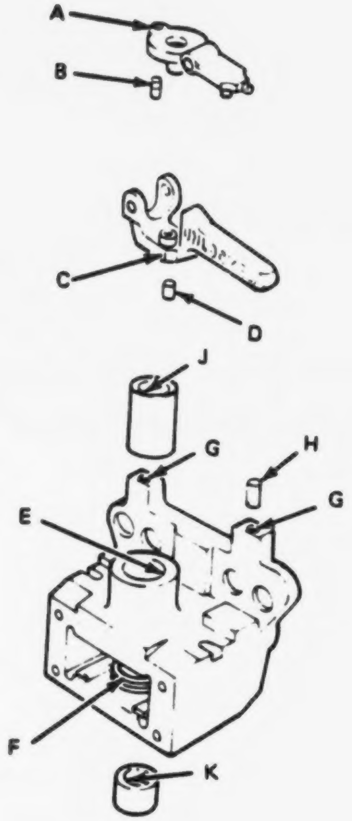
Step	Procedure
	SUPPORT SHOP WORK
1.	Take turret traverse lock and new pins or bearings to shop where press, machine reaming, and inspection equipment are available.
	a. Remove bad pins or bearings. b. Make dimensional check.

Reference Letter	Point of Measurement	Measurement
A	ID of pin hole in lever	0.2488 to 0.2498
B	Diameter of pin	0.2509 to 0.2511
C	ID of pin hole in handle	0.371 to 0.372
D	OD of pin	0.373 to 0.374
E,F	ID of housing bore for bearing	1.375 to 1.376
G	ID of pin holes in housing	0.4920 to 0.4950
H	OD of pins	0.4922 to 0.4952

c. Install new bearings.
d. Finish bearings and make dimensional check.

Reference Letter	Point of Measurement	Measurement
J,K	ID of bearing	1.125 to 1.126

Step	Procedure
2.	After support shop work, return turret traverse lock to turret shop.
	END OF TASK


A
B
C
D
J
G
H
G
E
F
K

19-7. HANDLE REMOVAL AND DISASSEMBLY PROCEDURE

TOOLS: Long nose pliers
7/16" socket (3/8" drive)
3/8" drive ratchet
8 ounce ball peen hammer
Scraper
Stiff bristled brush
1/4" drift pin punch
Fine stone

SUPPLIES: Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

PERSONNEL: One

REFERENCES: TM 9-2350-257-20-2-3 for procedure to remove turret traverse lock
JPG for procedures to:
- Remove cotter pins
- Clean parts
- Inspect and repair parts

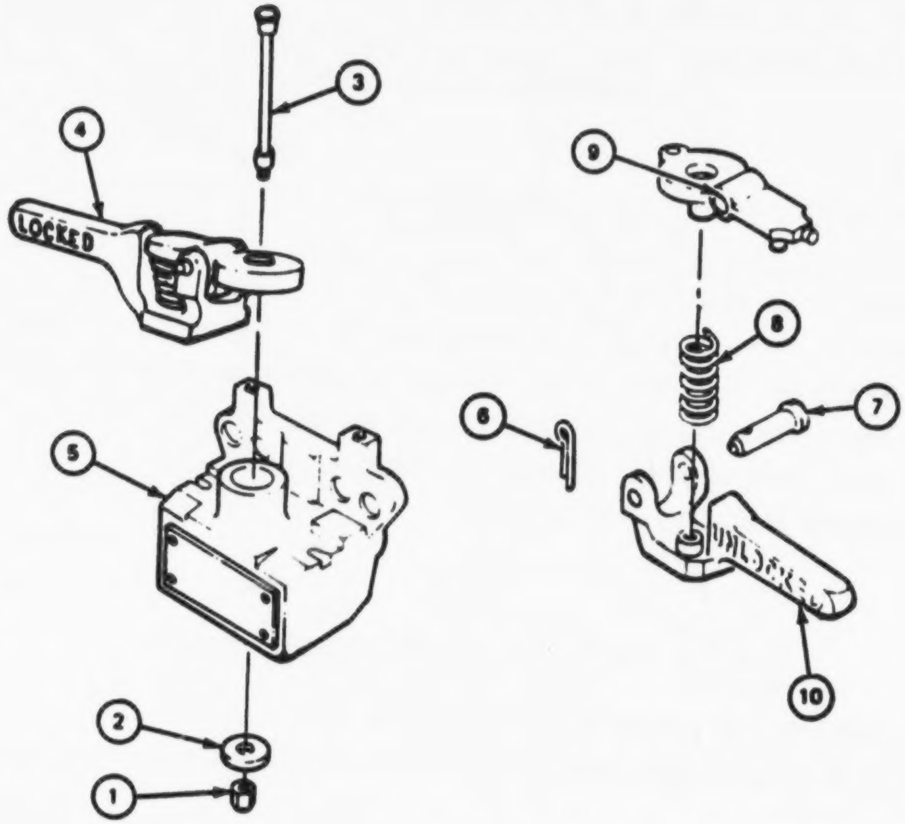
EQUIPMENT CONDITION: Turret traverse lock removed (TM-20-2-3)

PRELIMINARY PROCEDURES: Test turret traverse lock (para 19-3)

19-7. HANDLE REMOVAL AND DISASSEMBLY PROCEDURE (CONT)

FRAME 1

Step	Procedure
1.	Using socket wrench, remove nut (1) and flat washer (2) from shaft (3).
2.	Remove assembled handle (4) with shaft (3) from housing (5).
3.	Using hammer and punch, tap end of shaft (3) loose from assembled handle (4).
4.	Remove shaft (3) from assembled handle (4).
5.	Using pliers, remove cotter pin (6) from pin (7) (JPG).
	WARNING Sudden release of spring (8) pressure could hurt you. Press down on lever (9) to compress spring slightly when removing pin (7).
6.	Using hammer and punch, remove pin (7) that attaches lever (9) to handle (10).
7.	Slowly release pressure on lever (9) and remove lever and spring (8) from handle (10).
	NOTE Follow-on Maintenance Action Required: Clean all parts (JPG). Inspect and repair all parts (JPG). Do detail inspection of parts (para 19-2).
	END OF TASK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19-8. HANDLE ASSEMBLY AND INSTALLATION PROCEDURE

TOOLS: Long nose pliers
7/16" socket (3/8" drive)
3/8" drive ratchet

SUPPLIES: Cotter pin

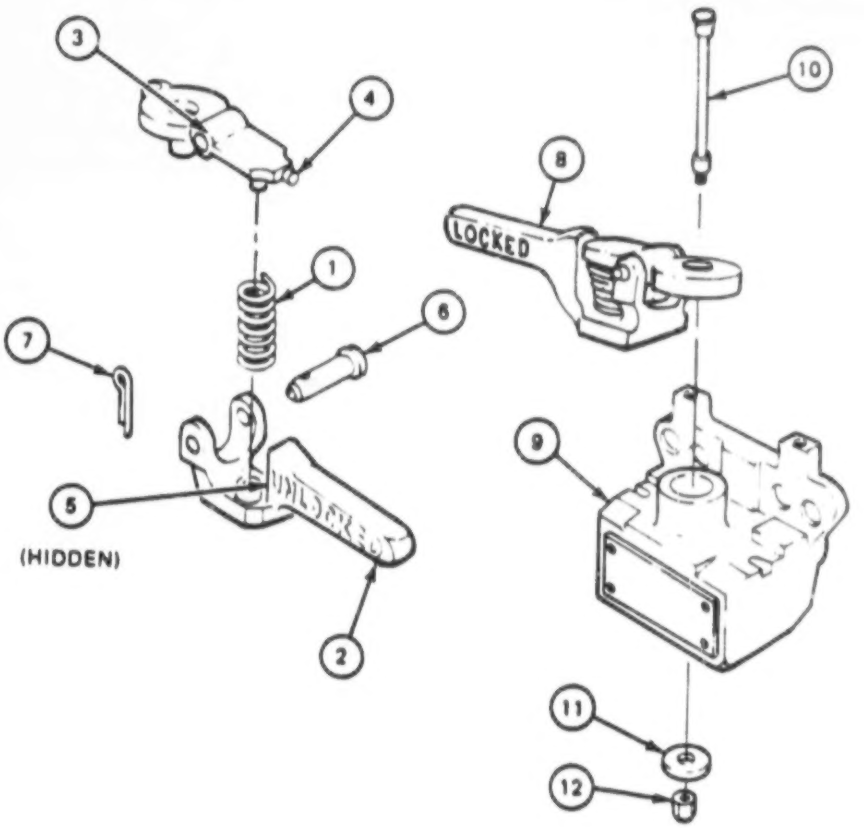
PERSONNEL: One

REFERENCES: JPG for procedure to install cotter pins

PRELIMINARY PROCEDURES: Inspect handle (para 19-2)
Assemble housing (para 19-10)

FRAME 1

Step	Procedure
1.	Put spring (1) on handle (2).
2.	Put lever (3) on top of spring (1) engaging lever pin (4) in groove (5) of handle (2).
3.	Press down lever (3) to hold spring (1) slightly compressed and align holes for pin (6).
4.	Using hands, attach lever (3) to handle (2) with pin (6).
5.	Using pliers, install cotter pin (7) in pin (6) (JPG).
6.	Put assembled handle (8) on housing (9).
	NOTE It may be necessary to turn handle (8) slightly to put in shaft (10).
7.	Align shaft (10) with hole in lever (3) and put in shaft.
8.	Using socket wrench, attach shaft (10) to housing (9) with flat washer (11) and nut (12).
	NOTE Follow-on Maintenance Action Required: Test turret traverse lock (para 19-3).
	END OF TASK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19-9. HOUSING DISASSEMBLY PROCEDURE

TOOLS: 1/4" flat tip screwdriver
8 ounce ball peen hammer
1/4" drift pin punch
Scraper
Stiff bristled brush
Fine stone

SUPPLIES: Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

PERSONNEL: One

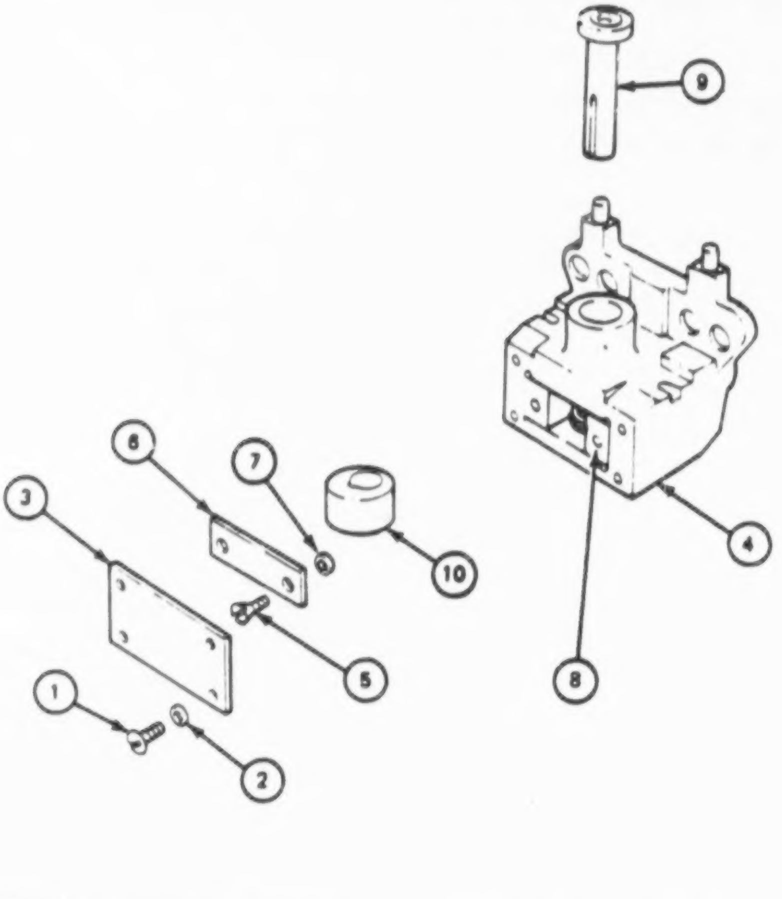
REFERENCES: JPG for procedures to:
Clean parts
Inspect and repair parts

PRELIMINARY PROCEDURES: Remove handle (para 19-7)

19-9. HOUSING DISASSEMBLY PROCEDURE (CONT)

FRAME 1

Step	Procedure
1.	Using screwdriver, remove four screws (1) and four lockwashers (2) that attach cover (3) to housing (4).
2.	Remove cover (3).
3.	Using screwdriver, remove two screws (5) that attach wear plate (6) and two shim washers (7) from bolt (8).
4.	Remove camshaft (9) and cam (10) from housing (4). GO TO FRAME 2



19-9. HOUSING DISASSEMBLY PROCEDURE (CONT)

FRAME 2

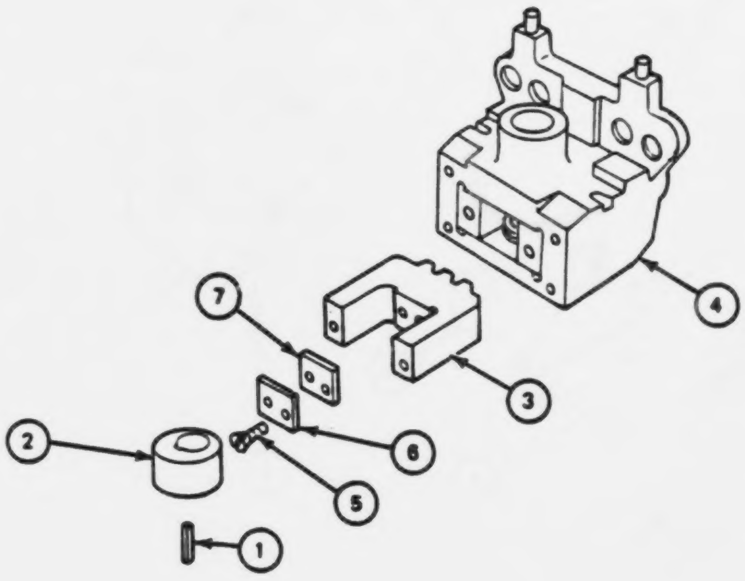
Step	Procedure
1.	Using hammer and punch, remove key (1) from cam (2).
2.	Remove bolt (3) from housing (4).
3.	Using screwdriver, remove two screws (5) that attach plate (6) and shims (7) to bolt (3).
4.	Remove plate (6) and shims (7).

NOTE

Follow-on Maintenance Action Required:

Clean all parts (JPG).
Inspect and repair all parts (JPG).
Do detail inspection of parts (para 19-2).

END OF TASK



19-10. HOUSING ASSEMBLY PROCEDURE

TOOLS: 1/4" flat tip screwdriver
Feeler gauge
8 ounce ball peen hammer
1/4" drift pin punch

SUPPLIES: Flat washer shim (8762422)
Shim (7953799)

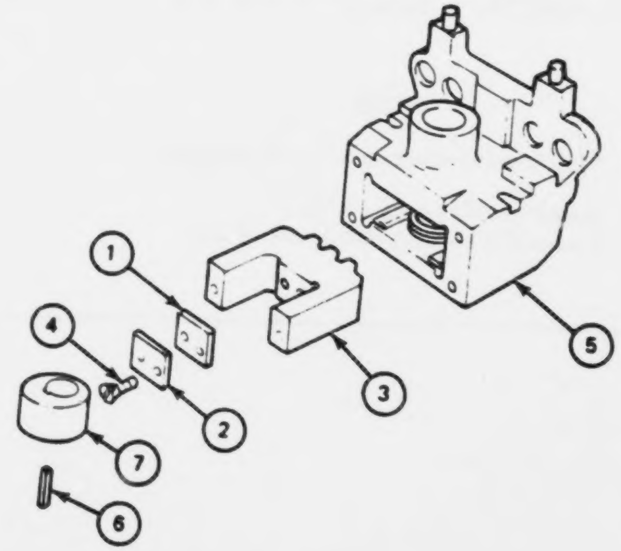
PERSONNEL: One

REFERENCES: JPG for procedure to use feeler gauge

PRELIMINARY PROCEDURES: Inspect housing turret lock parts (para 19-2)

FRAME 1

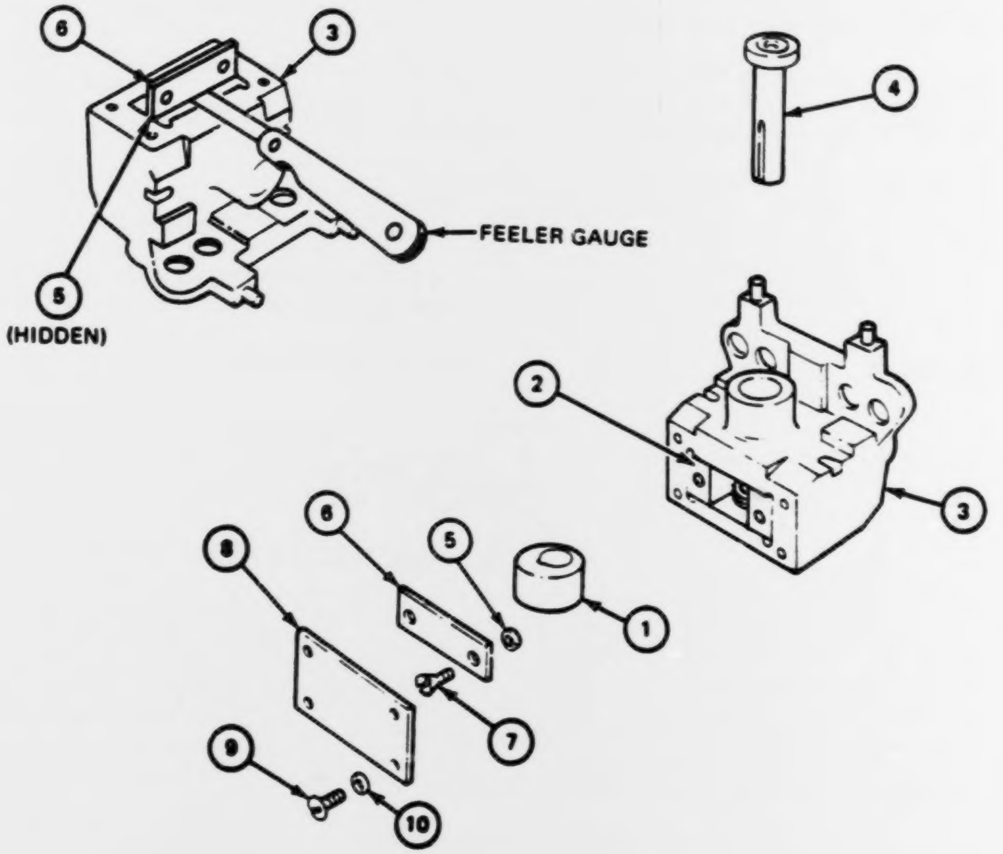
Step	Procedure
	NOTE Position wear plate (2) with countersunk holes up.
1.	Using screwdriver, attach shim (1) and wear plate (2) to bolt (3) with two screws (4).
2.	Put bolt (3) in housing (5).
3.	Using hammer and punch, lightly tap key (6) in cam (7) keyway. GO TO FRAME 2



19-10. HOUSING ASSEMBLY PROCEDURE (CONT)

FRAME 2

Step	Procedure
1.	Put cam (1) in bolt (2) inside housing (3).
2.	Align keyway in camshaft (4) with key in cam (1).
3.	Put camshaft (4) in housing (3).
4.	Put two shim washers (5) on bolt (2).
5.	Using wear plate (6) as straight edge, put wear plate on shim washers (5).
	NOTE Clearance between wear plate (6) and cam (1) should be between .002" and .006" with high side of cam up.
6.	Using feeler gauge, measure clearance between cam (1) and wear plate (6) (JPG).
	NOTE Shim washers (5) have .002 laminations that can be separated for proper clearance.
7.	Using screwdriver, attach proper shim washer (5) and wear plate (6), with countersunk holes up, to bolt (2) with two screws (7).
8.	Using screwdriver, attach cover (8) to housing (3) with four screws (9) and four lockwashers (10).
	NOTE Follow-on Maintenance Action Required: Install handle (para 19-8). Test turret traverse lock (para 19-3).
	END OF TASK


FEELER GAUGE
(HIDDEN)

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3		2		Item 10. Change illustration. Reason: Tube end shown assembled on wrong side of lever cam.
109		51		Item 3. The NSN and P/N are not listed on the AMDF nor the MCRL. Request correct NSN and P/N be furnished.
2-8			2-1	Preventive Maintenance Checks and Services. Item 7 under "Items to be inspected" should be changed to read as follows: Firing linkage and firing mechanism pawl.
12	1-6a			Since there are both 20- and 30- round magazines for this rifle, data on both should be listed.

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SOMETHING WRONG WITH THIS MANUAL?

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FROM: (YOUR UNIT'S COMPLETE ADDRESS)

DATE

PUBLICATION NUMBER	DATE	TITLE

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER	SIGN HERE:

DA FORM 1 AUG 74 2028-2

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR MANUAL "FIND," MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

TEAR ALONG DOTTED LINE

FILL IN YOUR
UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

____

____

OFFICIAL BUSINESS

Commander
US Army Armament Materiel Readiness Command
ATTN: DRSAR-MAS
Rock Island, IL 61299

ALONG DOTTED LINE

FOLD BACK

REVERSE OF DA FORM 2028-2

Charts Transposed to

End of Volume.

FIL
UN

DEPAR

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 Lb
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches
1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet
1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles

CUBIC MEASURE

1 Cu Centimeter = 1000 Cu Millimeters = 0.06 Cu Inches
1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

TEMPERATURE

$5/9\,({}^0F - 32) = {}^0C$
212^0 Fahrenheit is equivalent to 100^0 Celsius
90^0 Fahrenheit is equivalent to 32.2^0 Celsius
32^0 Fahrenheit is equivalent to 0^0 Celsius
$9/5\,C^0 + 32 = F^0$

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621

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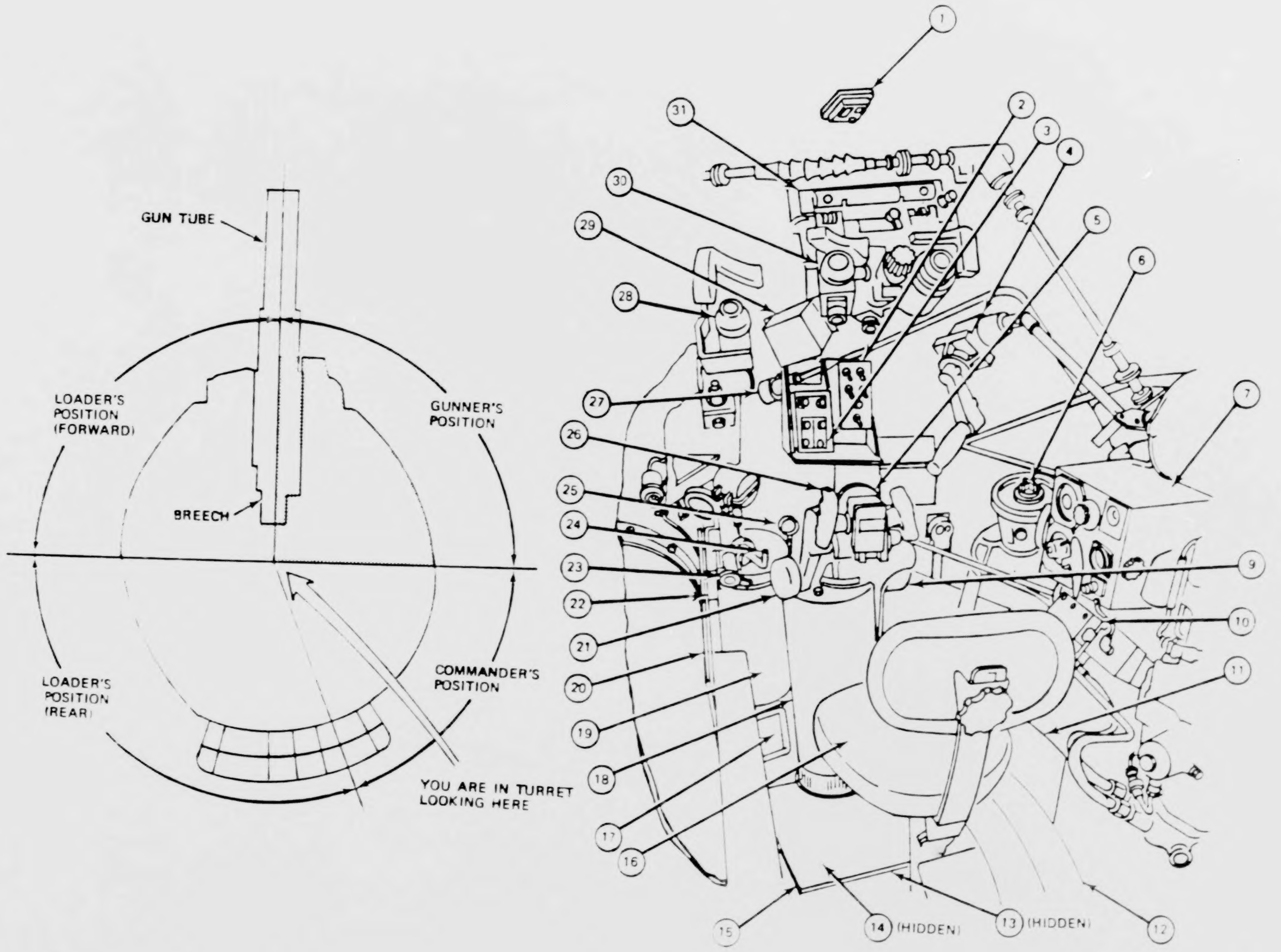
TA089991

LEGEND:

1. GUNNER'S DOMELIGHT
2. GUNNER'S CONTROL BOX
3. STABILIZATION CONTROL SELECTOR
4. HAND TRAVERSING DRIVE
5. GUNNER'S CONTROL
6. AZIMUTH INDICATOR
7. BALLISTIC COMPUTER
8. MANUAL TRAVERSING HANDLE
9. TURRET HYDRAULIC SYSTEM FILTER
10. TRAVERSE STABILIZER VALVE
11. GUNNER'S FOOTGUARD
12. 7.62 MM AMMUNITION BOX
13. POWER PACK BLOWER
14. TURRET POWER AND SEARCHLIGHT RELAY BOX
15. GUNNER'S FOOTREST PLATE
16. GUNNER'S SEAT
17. GUNNER'S KNEE GUARD
18. POWER PACK
19. MAIN ACCUMULATOR
20. GUNNER'S GUARD
21. MANUAL ELEVATING HANDLE
22. STABILIZATION RATE SENSOR
23. ELEVATION QUADRANT
24. BLASTING MACHINE
25. PRESSURE GAUGE
26. GUNNER'S CONTROL HANDLES
27. SUPERELEVATION ACTUATOR
28. ARTICULATED TELESCOPE M105D
29. TURRET GUN FIRING RELAY BOX
30. GUNNER'S PERISCOPE
31. GUNNER'S PERISCOPE MOUNT M118


GUN TUBE
BREECH
LOADER'S POSITION (FORWARD)
GUNNER'S POSITION
LOADER'S POSITION (REAR)
COMMANDER'S POSITION
YOU ARE IN TURRET LOOKING HERE
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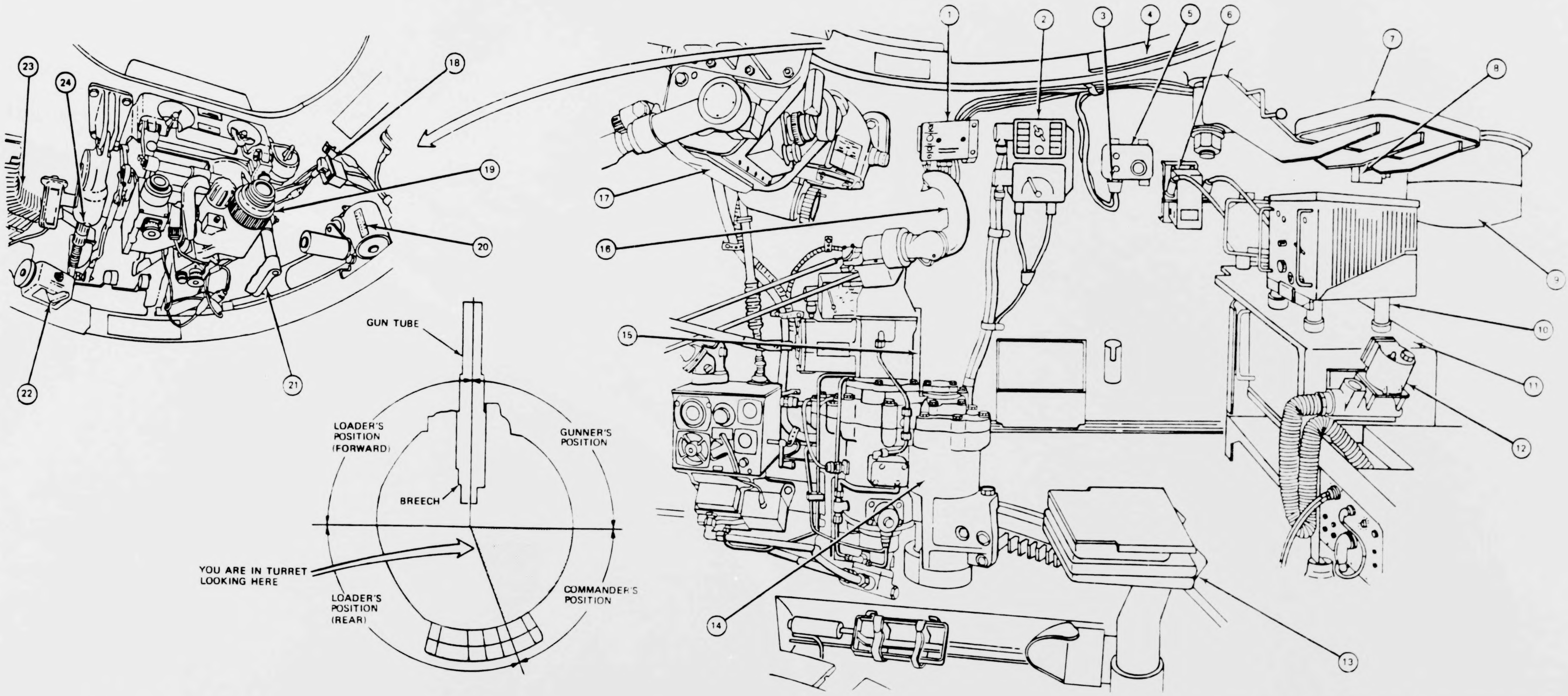
FO-1. EQUIPMENT LOCATION INFORMATION - GUNNER'S POSITION

best copy available

LEGEND:

1. CUPOLA ELECTRICAL POWER CONTROL PANEL
2. COMMANDER'S INTERPHONE CONTROL BOX
3. SEARCHLIGHT DUMMY PLUG
4. BACKREST PAD
5. SEARCHLIGHT CONTROL BOX
6. BATTLE OVERRIDE SWITCH (RADIO)
7. COMMANDER'S SWING SEAT
8. INTERCONNECTING BOX
9. TURRET VENTILATING BLOWER
10. TURRET RADIO SUPPORTS
11. RADIO RACK
12. COMMANDER'S ELECTRIC AIR FILTER HEATER
13. COMMANDER'S SEAT
14. TURRET TRAVERSING MECHANISM
15. ANTI-BACKLASH MECHANISM
16. COMMANDER'S CONTROL HANDLE
17. FIRE CONTROL RANGEFINDER
18. CUPOLA GUN SAFETY SWITCH AND GUARD
19. COMMANDER'S PERISCOPE
20. CUPOLA AZIMUTH GEAR BOX
21. SHIELD OPERATING HANDLE
22. CUPOLA AZIMUTH LOCK
23. FLEXIBLE CHUTE
24. ELEVATION SCREW JACK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GUN TUBE
LOADER'S POSITION (FORWARD)
GUNNER'S POSITION
BREECH
YOU ARE IN TURRET LOOKING HERE
LOADER'S POSITION (REAR)
COMMANDER'S POSITION
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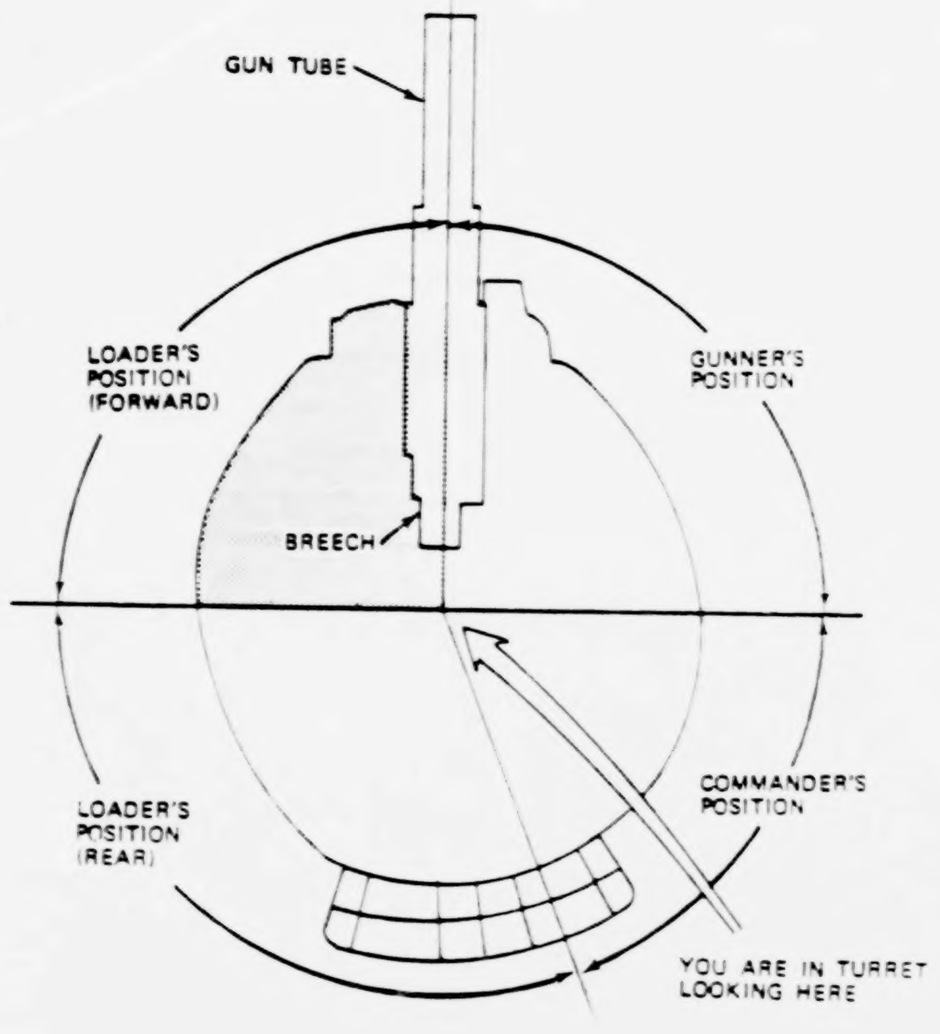
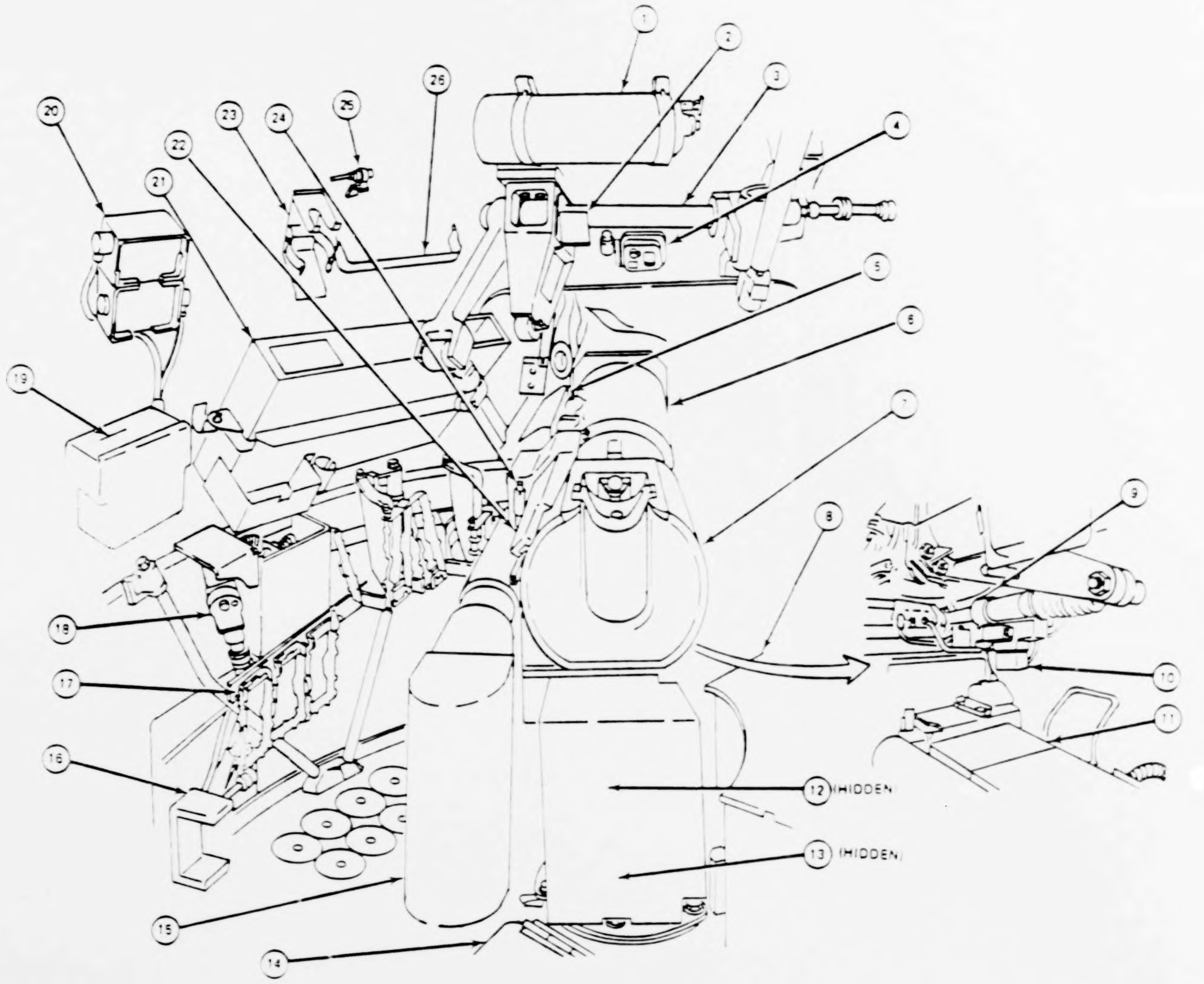
FO-2. EQUIPMENT LOCATION INFORMATION - COMMANDER'S POSITION

LEGEND:

1. REPLENISHER
2. GUN ELEVATION INTERFERENCE SWITCH
3. BALLISTIC DRIVE
4. LOADER'S DOMELIGHT
5. MACHINE GUN MOUNT
6. 105—MM GUN
7. BREECH
8. CALIBER .50 AMMUNITION BOXES
9. ELEVATING MECHANISM
10. ELEVATION STABILIZER VALVE
11. PERISCOPE STOWAGE BOX
12. STABILIZATION CONTROLLER UNIT
13. TURRET ELECTRICAL SLIPRING
14. BATTERY ACCESS DOOR
15. 105—MM AMMUNITION THREE ROUND LEFT SIDE RACK
16. FIRE EXTINGUISHER MOUNTING BRACKET
17. 105—MM AMMUNITION RACK RETAINER
18. LOADER'S ELECTRIC AIR FILTER HEATER
19. LOADER'S PERISCOPE BOX
20. LOADER'S INTERPHONE CONTROL BOX
21. 7.62—MM READY ROUND AMMUNITION BOX AND COVER
22. LOADER'S GUARD
23. OILCAN MOUNTING BRACKET
24. LOADER'S SAFETY SWITCH
25. RADIATION DETECTOR
26. CANTEEN MOUNTING BRACKET


GUN TUBE
LOADER'S POSITION (FORWARD)
GUNNER'S POSITION
BREECH
LOADER'S POSITION (REAR)
COMMANDER'S POSITION
YOU ARE IN TURRET LOOKING HERE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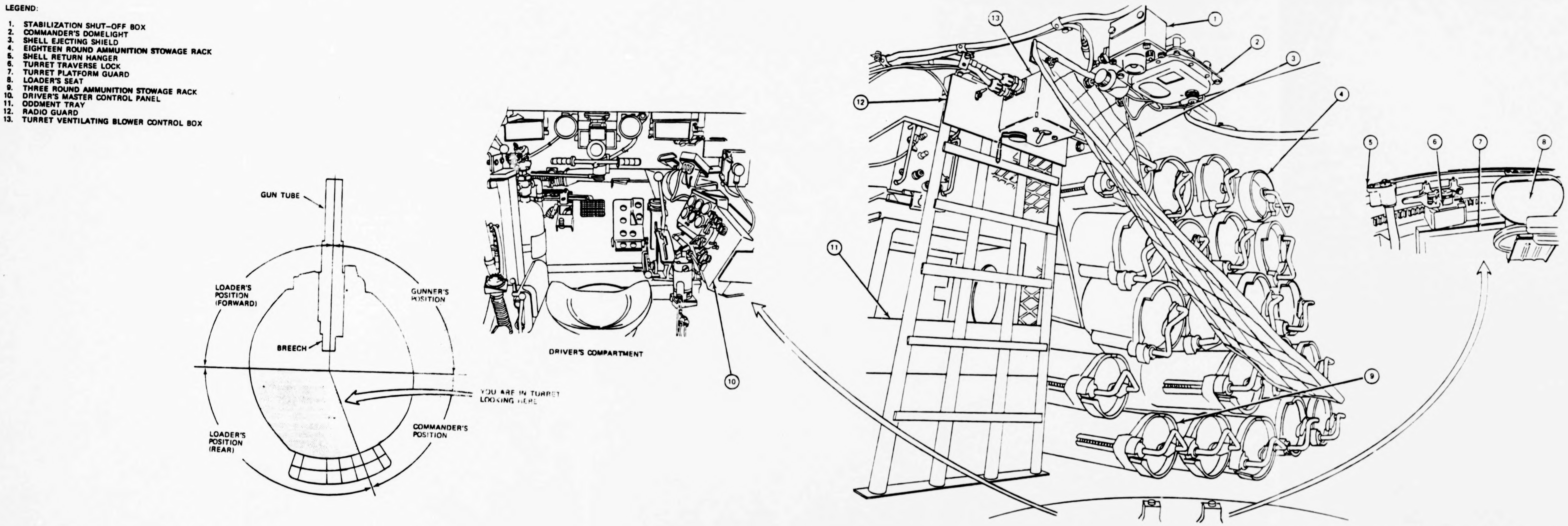
FO-3. EQUIPMENT LOCATION INFORMATION - LOADER'S POSITION (FORWARD)



LEGEND:

1. STABILIZATION SHUT–OFF BOX
2. COMMANDER'S DOMELIGHT
3. SHELL EJECTING SHIELD
4. EIGHTEEN ROUND AMMUNITION STOWAGE RACK
5. SHELL RETURN HANGER
6. TURRET TRAVERSE LOCK
7. TURRET PLATFORM GUARD
8. LOADER'S SEAT
9. THREE ROUND AMMUNITION STOWAGE RACK
10. DRIVER'S MASTER CONTROL PANEL
11. ODDMENT TRAY
12. RADIO GUARD
13. TURRET VENTILATING BLOWER CONTROL BOX

GUN TUBE
LOADER'S POSITION (FORWARD)
GUNNER'S POSITION
BREECH
YOU ARE IN TURRET LOOKING HERE
LOADER'S POSITION (REAR)
COMMANDER'S POSITION
DRIVER'S COMPARTMENT
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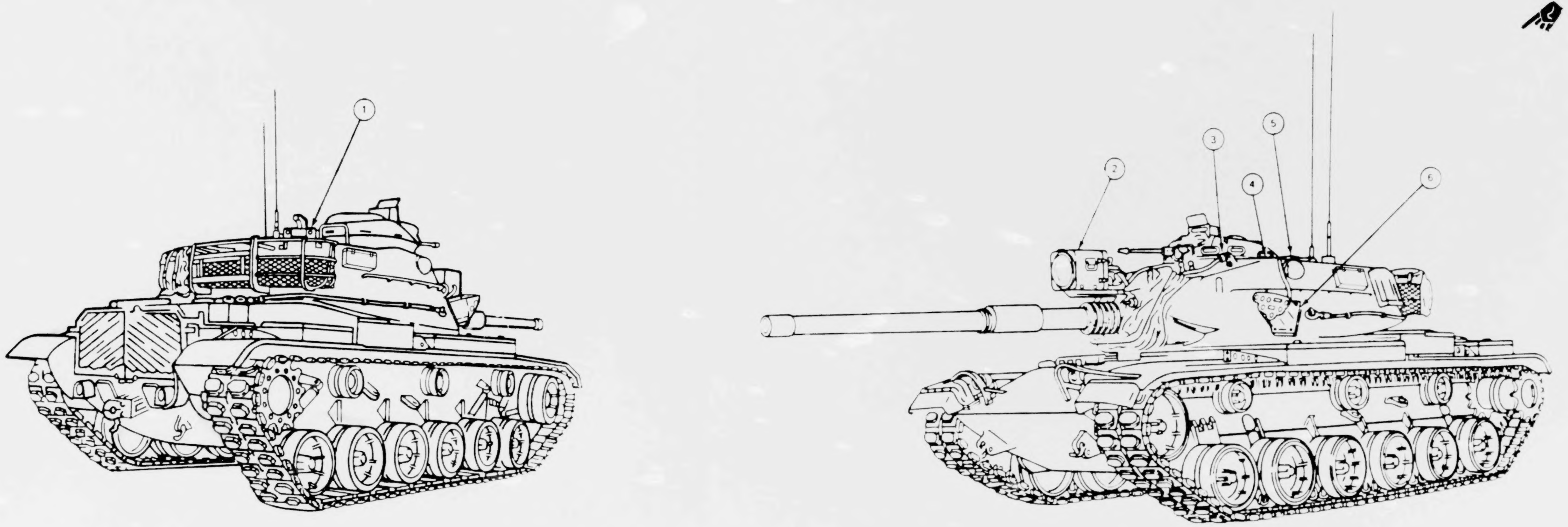
FO-4. EQUIPMENT LOCATION INFORMATION - LOADER'S POSITION (REAR)

LEGEND:

1. SEARCHLIGHT STOWAGE BOX
2. SEARCHLIGHT
3. SEARCHLIGHT CONNECTOR
4. LOADER'S ESCAPE HATCH
5. HOUSING
6. SMOKE GRENADE DISCHARGER



FO-5. EQUIPMENT LOCATION INFORMATION – OUTSIDE TANK